FIELD TRIP

GUIDE BOOK

SECOND ASEAN SOIL CONFERENCE

July 22 – 29, 1972

Sponsored by

THE MINISTRY OF AGRICULTURE

REPUBLIC OF INDONESIA

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Preface

After the 2nd ASEAN Soil Conference a post-conference tour of seven days will be made to West and Central Java.

As the field of interest of the participants cover many aspects of soil science, a wide variety of subjects were included in the excursion programme. Many practical problems will be met in the field during the excursion.

It is hoped that the opportunity to exchange views and experiences with colleagues from abroad will help each other to gain better understanding of their specific problems and to break the isolation which stood in the way of progress for such a long time.

It should be realized that sites scenery shown during this trip are typical of Java, although not representative for the whole of Indonesia. The less densely populated islands of Sumatra, Kalimantan and West Irian offer a completely different picture, which resembles more the one our ASEAN colleagues know from their home countries.

The densely populated island of Java is characterized by small average farm sizes and by intensive landuse, including multiple cropping even in marginal areas. Indonesian agriculture is partly of a

traditional type and the art of terrace construction and soil and water conservation was passed on from father to son for generations. Eighty percent of the population consists of farmers, partly tenants.

To increase the low average income of the Indonesian farmers, the Government launched an gigantic intensification programme (Bimas) with total area of about 3.8 million Ha of rice field every year, which resulted in significant (improvement) production during the last five years. However, the heavy population pressure also led to exploitation of the land which will be demonstrated at several places along the route. In places, the situation became even critical as is witnessed by severe erosion, increased flooding and draught which is as yet to be controlled by proper watershed management and soil conservation programme.

Due to the steadily increasing population, the pressure becomes stronger every year. The current Five Year Development Plan (PELITA) therefore aims at increased production of food crops and other agricultural products.

We still have a tremendous amount of work remain to be done to make a systematic inventory and to appraise the potential of our land resources for further developments i.e. intensification programme especially in Java and opening new land for regional development outside Java.

Page:

The present field guidebook is far from complete, in particular many of the necessary chemical and physical data, because of the insufficient facilities in Indonesia and also due to the limited time available. This book has therefore a limited intention, however, it provides a general information and a brief introduction to the phenomena shown during the excursion to stimulate fruitful discussions. Additional information will be given on the spot by the officials concerned and, expectedly, by other participants during the discussions.

The Organizing Committee wishes to express its gratitude to all those who contributed to this guidebook. Special acknowledgements are due to the technical staffs, the Agricultural Extension Service, the Directorate of Geology, the Institute for Hydraulic Engineering, the Forest Research Institute and the PN Aerial Survey.

Bogor, July 17th, 1972 The Organizing Committee

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ROUTE

POST CONFERENCE TOUR

SECOND ASEAN SOIL CONFERENCE

(JULY 22-29. 1972)

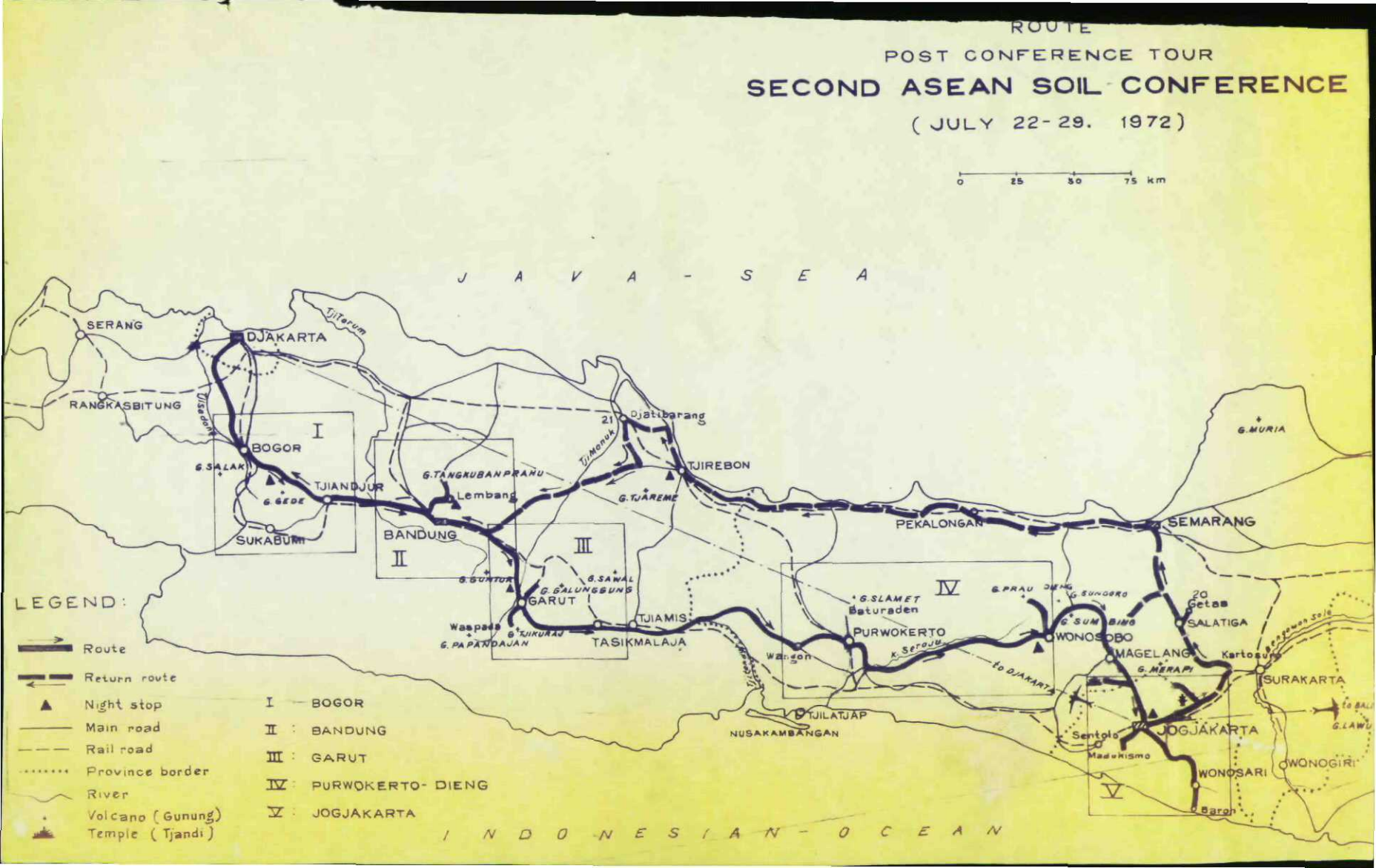
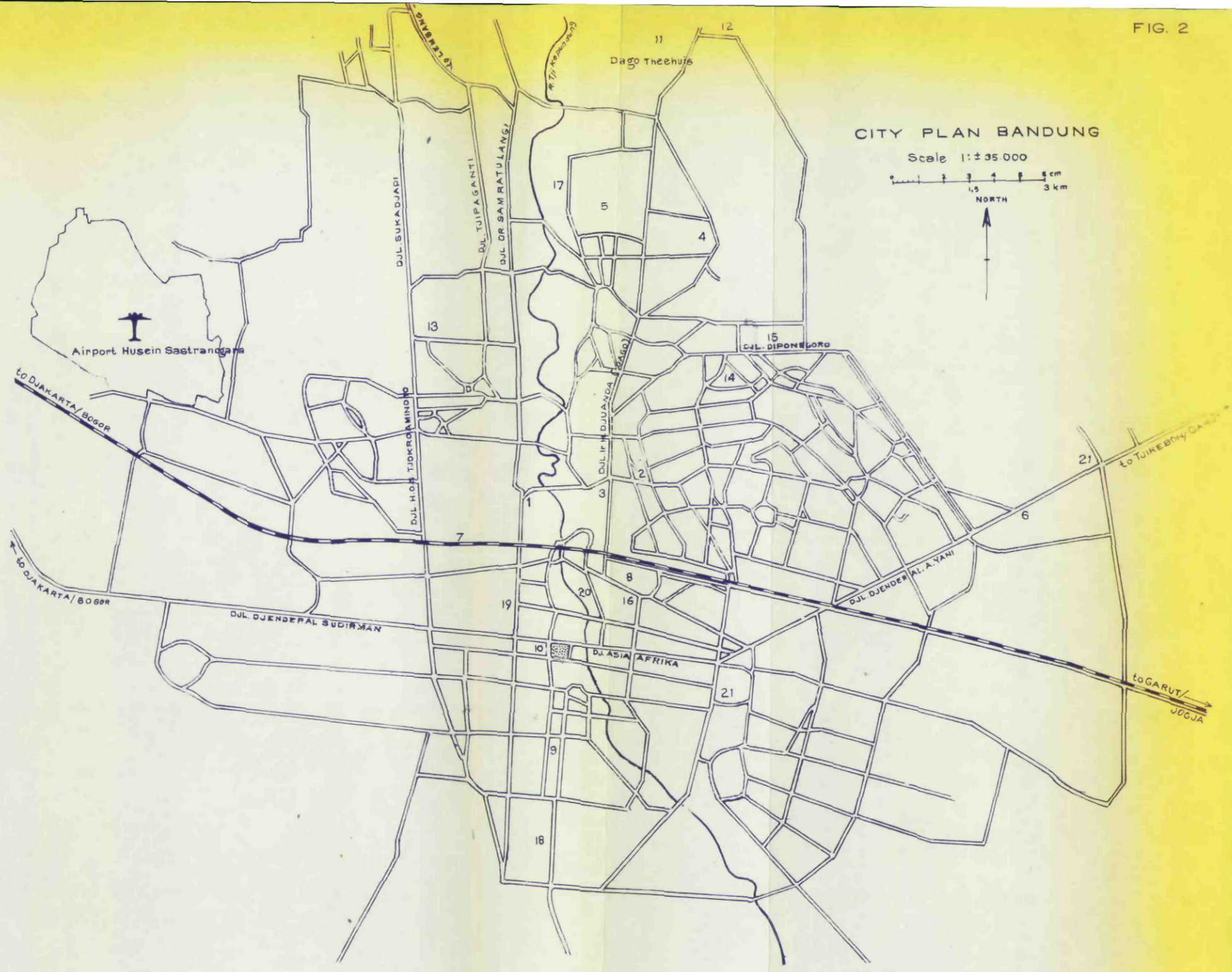


FIG. 2

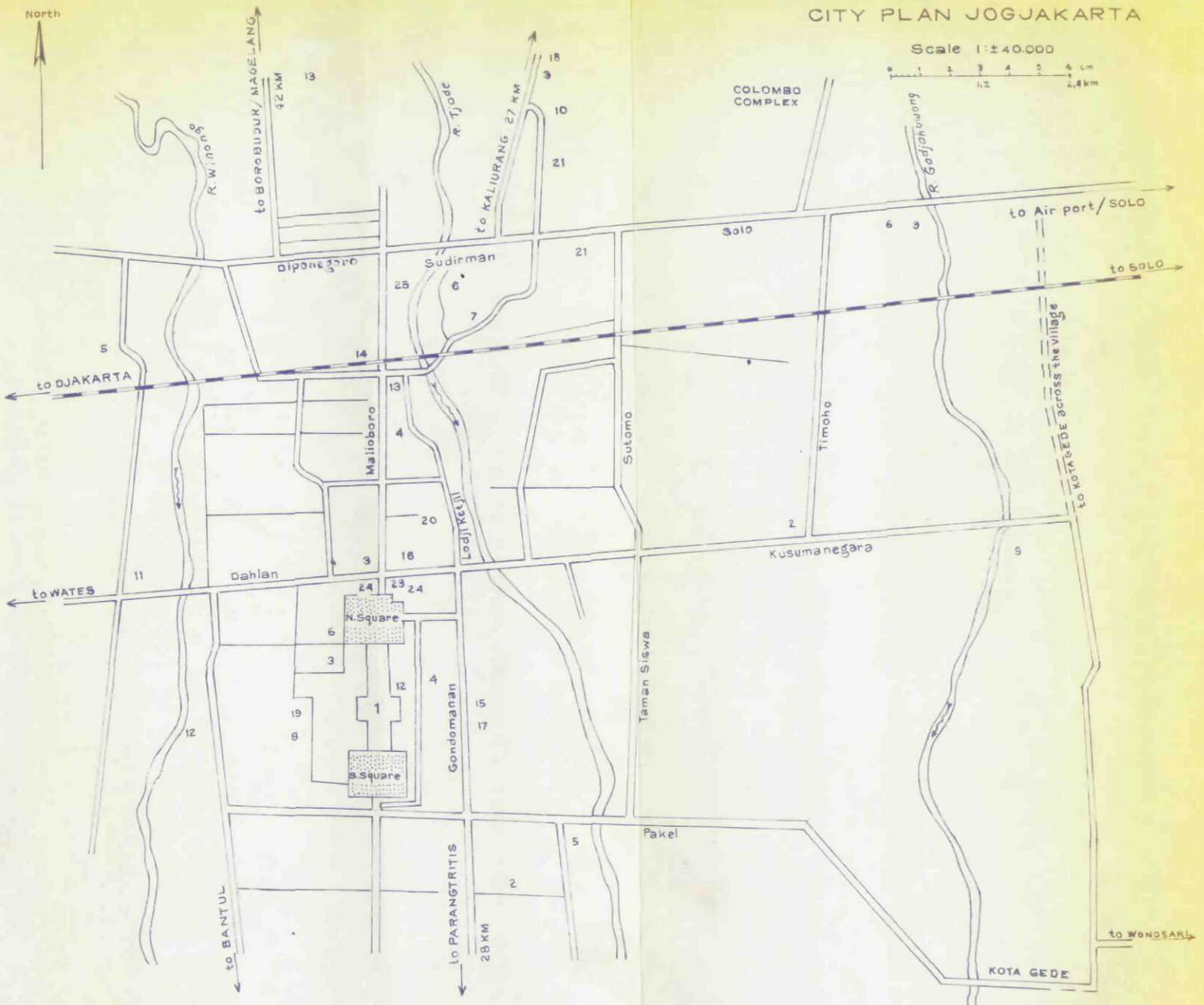


LEGEND :

1. Official Gouvernors House
2. Siliwangi Command Headquarter
3. Bandung Municipality
4. Padjadjaran State University
5. Institute Teknology Bandung
6. Institute Teknology Textile
7. Railway Station
8. Post Office
9. Bus Terminal
10. Mosques
11. Dago Tea House
12. Golf Course
13. Hospital
14. Public Works
15. Geology
16. Mandala Museum
17. Zoo
18. Horse Race Course
19. Market (Pasar Baru)
20. Braga Shopping Centre
21. Night Market

CITY PLAN JOGJAKARTA

Scale 1 : ± 40.000



LEGEND :

1. Sultan's Palace
2. Batik Research
3. Art Gallery
4. Kepatihan Hall
5. Museum
6. Mosque
7. Church
8. Water Castle
9. Zoo
10. Gadjah Mada University
11. Academy of Fine Art
12. Dance Academy
13. Garuda Hotel
14. Railway station
15. Bus Station
16. Market
17. Recreation Ground (T.H.R)
18. Sculptor
19. Bird Market
20. Jeweller
21. Hospital
22. Shopping Centre
23. Post office
24. Bank
25. Garuda Air line
26. Gold and silver smith centre
27. Govern mental Building

INTRODUCTION

1. Informations

a. After the conference in Djakarta a seven day field trip by road has been arranged from the 22nd to the 28th July 1972, following the schedule (as) given below.

b. On the 29th of July 1972 arrangements are made for those participants who intend visit Bali by taking the afternoon plane from Jogjakarta.
For participants going back to Djakarta, an addi - tional 2 days programme has been organized in Salatiga and Tjirebon.

c. Two tourist busses, one microbus and 7 Jeeps will take part to this trip. For safety reason, a police car will pilot the convoy; it will also take care of clearing road during the tour. In Garut, Wonosobo and Jogjakarta additional cars will be provided by local authorities to take over from the busses for climbing along smaller mountain roads.

d. The whole programme includes about 20 discussion points in the field, 8 include visits (laboratory, displays, processing, etc), 3 official and 1 un - official entertainments, 3 touristic visits (Tangkubanparahu volcano, Dieng and Borobudur).
In Bandung and Jogjakarta additional small tours will be arranged to see the cities and some of their cultural attractions.
For the ladies a special programme will be arranged daily depending on the interest.

e. In Jogjakarta farewell party will close officially the post-conference tour on the 28th of July.

f. As the daily programme is very tight all the participants of the trip are requested to observe the regulation outlined in chapter 2. Every day the tour will start at 08.00 o'clock sharp and should arrive at the next nightstop at 18.00 o'clock. Discussion on each site is limited to one hour and half an hour only per brief stops.

g. This field guide-book includes both general and detailed information. The former deals with a general picture about the topography, climate, geology, soils and landuse of the area traversed during the tour.

The detailed information relates to the spesific description on each site. To give a better picture about the geology and the soil distribution along the route, five regions were selected and maps at the scale 1 : 250.000 attached. The site locations appear on each respective soil map. Tables on field and laboratory data are appended too.

h. Accomodation were made in hotels and bungalows at an approximate rate of $ 10 to 15 (equivalent Rp 4.000 to Rp 6.000) for a double room.
For further details see chapter 2.

i. Lunch pachet will be provided free by the Committee. Diners are not included in the room prices above.

j. A medical assistant will be available during the whole trip.

k. For the convenience of the foreign participants the following items are provided :
   - a list of simple useful Indonesian terms and sentences
   - a list handicraft and antiques shops and city plans of Bandung and Jogjakarta.

l. Lists of participants, members of the Organizing Committee c.q. the Field Trip Commission are also attached.

2. Regulations

A team of field guides will be in service for all the participants and will look after every aspect of the tour (the technical as well the non technical).

The ladies group will dispose of a special microbus during the trip to facilitate them making her own programme independently in each town.

Any complaints concerning accomodations, meal, transport or any other service one is requested to contact and report to the officer in charge.

For the smooth operation of the tour some regulations were issued which are brought to the attention of the participants. They refer to the following matter :

A discussion
B accomodation
C transportation

A. Regulations on discussion

(a) Technical discussions will take place at every step in the field and indoors as well.

(b) A time limit of 60 minutes per site (30 minutes only for brief stops) will be used as follows :

2-5 minutes for general introduction by the field guide.

3-5 minutes for detailed information by the resp project leader.

5 minutes to study the soil pit or the environment.

15-45 minutes discussion.

(c) Each participant should keep his questions/remarks as short as possible to enable exchange of views with others.

(d) The matter can possibly be further discussed in the bus or other occasions.

(e) On special occasions, the discussion can go on while the group proceeds to the next pit or the following subjects (on displays, visiting laboratories etc).

(f) Each technical discussion will be coordinated by a field manager and recorded by a special team.

(g) A megaphone, a microphone, a tape recorder, a walkie-talkie and a set of tools for inspecting soil pits will be at hand for use by the field team.

B. Regulations on accomodation

a. Upon arrival at each overnightory each participant will be accomodated in hotels or bungalows.

b. As the facilities on Java are not as good as in Djakarta each participant will have to share their room and are requested to adapt themselves to the local conditions.

c. The prices of double rooms in the hotels visited during the post-conference tour are approximately as follows :

- Tjibogo - US $ 13,-
- Lembang - US $ 12,-
- Garut - US $ 10,-
- Wonosobo - US $ 12,-
- Jogjakarta - US $ 15,-

d. Meals will be given in the resp. hotels/bungalows. Breakfast and dinner are included in the hotel prices paid by the participants. In all places except Tjipanas (Garut) there is a choice of European and national menus.

e. Lunches are usually served on the field at the committee's expence. In some places special national dishes will be offered.

f. In each hotel there are facilities to send letters, to buy souveniers, to change money and to iron laundries etc.

C. Regulations on transport

a. All participant are kindly requested to be ready for departure everyday at 08.00 o'clock sharp and/or leave each site stop as stipulated above.

b. Foreign participants and members of the Organizing Committee will occupy a seat in the two busses, while the jeeps are assigned to the local participants and assistants of the Committee. During the whole trip all participants are kindly requested to stay with their original respective.

c. In Wonosobo and Jogjakarta for the trip to Dieng and Woro respectively, all passengers of the two busses will be transferred to other smaller cars provided by the local Government.

d. A pilot car of the police head will the convoy for the whole trip. The car is equiped with a radio transmatter receiver.

e. In case of illness or injury medical cares will be provided by a medical assistant.

f. A special car with technicians and the transportation leader in charge will follow the convoy at an interval of 1 - 2 hours in order to pick up eventually lost belongings or left over members of the group and to assist in case of minor traffic or mechanical accidents.

FIELDTRIP SCHEDULE

The schedule outlined for the fieldtrip is drawn with the aim to show as many aspects as possible of the country :

(1) the characteristics of the most important soils of Java with their potentials and limitations, the systems of classification currently used in Indonesia, the investigations carried out on chemical, physicals aspects (responses for fertilizers).

(2) the environments and landuse of the various soils; the investigations on the effect of landuse on erosion (experiments on stabilization).

(3) the research carried out on water requirements with respect to several various.

(4) some specific natural phenoma their effect on soil development and landuse.

(5) some cultural and tourists events and

(6) recreation with entertainments and outdoor sceneries representing Indonesian character.

The daily programme schedule is very tight and the success of the tour depends on the full cooperation of every participants.

Due to inforseen circumstances changes night however occur.

Post Conference Tour

		Arr	Dep
July 22 (Saturday)	: Route : Djakarta-Bogor (via Parung) Tjibogo (95 km)		08.00
	Subjects: (Map I)		
	1. Visit to institutions in Bogor		
	a. Soil Research Institute	09.30	11.00
	(1) Laboratories		
	(2) Display		
	Coffee break	10.30	11.00
	b. Bogor Agricultural University (IPB)	11.15	12.00
	c. Botanical Garden	12.15	13.00
	Lunch in the garden	13.00	14.00
	d. Research Institute for Estate Crops	14.15	15.15
	e. Muara Experimental Garden of the Central Research Institute for Agriculture	15.30	17.00
	(1) Experimental plots		
	(2) Latosol sawah profile		
	Soft drink in the field	16.30	17.00
	Nightstop: Gubug Djaja and Tjibogo bungalow/hotel	18.00	

		Arr	Dep
July 23 (Sunday)	: Route: Tjibogo-Bandung-Lembag (150 km)		08.00
	Soft drink in the bus.		
	Subjects: (Map II)		
	2. Visit to the Laboratory of PN. Aerial Survey (PENAS), Lembang (Display of activities)	11.30	12.30
	Lunch in New Grand Hotel, Lembang	13.00	14.00
	3. Soil and landuse in Margahaju (Lembang)		
	a. Andosol profile derived from andesitic tuff of Tangkubanparahu volcano		
	b. Stabilization experiments with bitumen emulsions carried out by the Soil Research Institute at Margahaju Exp. Station	14.30	15.30
	Soft drink in the garden		
	4. Recreation: Visit to the Tangkubanparahu crater		
	c. Crater "Upas" and "Ratu"	16.00	17.30
	Nightstop: New Grand Hotel, Lembang (in the evening: Entertainment and sight seeing)	18.00	

		Arr	Dep
July 24 (Monday)	: Route: Lembang-Bandung-Tarogong-, Waspada-Karangpawitan-Tjipanas (100 km)		08.00
	Subjects: (Map II, Map II)		
	5. Visit to the Geological Museum, Bandung	08.25	09.15
	Soft drink in the bus		
	6. Soil and landuse in the surroundings of Garut:		
	a. Field trials on wet rice by ENSP*) in Tarogong	11.15	12.15
	b. Visit to Tjimanuk "Waspada" Experimental Basin in the Tjimanuk Catchmen area	13.15	15.00
	Lunch at Waspada	14.00	15.00
	c. Mediterranean soil and use in Karangpawitan	16.00	16.30
	Coffee break in Tjipanas		
	7. Lavaflow and vegetation of the Guntur volcano (Tjipanas)	17.00	17.30
	Nightstop: "Lembur Kuring" bungalows in Tjipanas (hotsprings)	18.00	

*) European Nitrogen Service Programme

		Arr	Dep
	8. Entertainment: Sundanese dances in the Governmental Bungalow Bharatayudha, Tjipanas	20.00	22.00 zie programma
Juli 25 (Tuesday)	: Route: Tjipanas-Garut-Tasikmalaja-Bandjar-Wangon-Purwokerto-Wonosobo (300 km)		08.00
	Subjects: (Map III, Map IV)		
	9. Brief stop in Gunung Djambe village (Tasikmalaja): Geomorphology, soil and landuse in the country of the Ten Thousand hillocks of the Galunggung volcano	09.30	10.00
	Soft drink in the bus		
	Lunch in Wangon (Brief explanation of the Tadjum irrigation development project)	13.00	14.30
	Nightstop: Merdeka Hotel in Wonosobo	18.00	

		Arr	Dep
July 26 (Wednesday)	: Route: Wonosobo-Dieng-Wonosobo-Jogjakarta (250 km)		08.00
	Subjects: (Map IV, Map V)		
	10. Brief stop at Sitieng village (Landuse and scenery)	08.30	09.00
	11. Soil, landuse and geology in the Dieng plateau (ca 2.000 meter above sea level)		
	a. Organosol and Humic Gley Soil	09.30	10.30
	b. Hindu temples (Coffee served)	10.30	11.30
	c. Visit to the mushroom production and canning	11.00	13.30
	Lunch at the Dieng Djaja	13.30	14.30
	Coffee break in Merdeka Hotel, Wonosobo	15.30	16.00
	Nightstop: Garuda Hotel, Jogjakarta (Shopping Centre area)	18.30	
July 27 (Thursday)	: Route: Jogjakarta-Woro-Madukismo-Borobudur-Jogjakarta (100 km)		08.00

	Arr	Dep
Subjects: (Map V)		
12. Protection measures against lahar and sandflow from the Merapi volcano		
a. Sand pocket and levee construction in the Woro river by Public Works	09.00	09.30
b. Field experiments with bitumen emulsion carried out by the Soil Research Institute	09.30	10.00
Soft drink in the field		
13. Visit to the Madukismo Sugar factory	11.00	14.00
a. Sugarcane fertilization	11.30	12.30
b. Sugar factory	12.30	13.00
Lunch by courtesy of the Sugar factory	13.00	14.00
14. Visit to the Borobudur temple (history, construction, etc)	15.00	17.00
Soft drink at the temple		
Nightstop: Garuda Hotel, Jogjakarta	18.00	

		Arr	Dep
	15. Entertainments: Central Javanese dances in the "Kapatihan" hall	20.00	22.00
July 28 (Friday)	: Route: Jogjakarta-Pijungan-Wonosari-Baron-Jogjakarta (150 km)		08.00
	Subjects: (Map V)		
	16. Fertilizer trials on Regosol in the Pijungan area	08.30	09.30
	17. Soil erosion problems, landuse and geology in the Baturagung range (Patuk)	09.45	10.15
	18. Soil, landuse and geology in the Wonosari area.		
	a. Rendzina under forest in the Bunder area	10.30	11.00
	Coffee break + snack in the field	11.00	11.30
	b. Grumusol and landuse in Wonosari area	12.00	12.30
	c. Karst landscape, underground river and sinkholes in Mulo area	13.00	13.30
	d. Beach formation and fresh water wells at Baron (coastal area)	14.00	16.00

		Arr	Dep
	Lunch at Baron	14.00	16.00
	Nightstop: Garuda Hotel, Jogjakarta	18.00	
	19. Farewell party	20.00	21.30
July 29 (Saturday)	: Arrangements are made for participants intending to leave Indonesia from Denpasar (Bali) to take the afternoon plane from Jogjakarta. For participants on route back to Djakarta an additional program is provided :		
	Route: Jogjakarta-Kartasura-Salatiga Getas-Salatiga-Semarang-Tjirebon (350 km)		08.00
	Subjects:		
	20. Brief visit to the Rubber Research Center of Getas (Salatiga)	10.00	11.00
	Soft drink in Getas		
	Lunch at Pingit Restaurant (1000 meter above sea level)	12.00	13.30
	Soft drink at Subah	15.00	16.00

		Arr	Dep
	Dinner at Virodesa (Pekalongan)	18.30	19.30
	Nightstop: Grand Hotel,	21.30	
July 30 (Sunday)	: Route: Tjirebon-Rentang-Bandung-Bogor-Djakarta (360 km)		09.00
	Subjects:		
	21. Water requirement studies on wet rice field in the Grumusol area of Djatibarang (Rentang project of Prosida/IPB)	10.00	11.30
	Soft drink in Djatibarang	11.00	11.30
	Lunch in Bandung	14.00	15.00
	Coffee break in Patjet	17.30	18.30
	Arrival in Bogor/Djakarta	20.00	21.00

GENERAL INFORMATION

1. Topography.

The island of Java has its longest axes in West-East direction. It is about 1.000 km long and 200 - 300 km wide. Its highest parts are formed by a mountain range in its central part with peaks ranging from 2000 to 3500 meter above sealevel.

A representative north-south cross section is the following :

(a) the alluvial plain, 0 - 25 meter in elevation, 20 - 60 km in width, nearly level

(b) the lowland, 25 - 250 meter in elevation, 20 - 50 km in width, gently sloping to rolling

(c) the hilly land, 250 - 1000 meter in elevation, 10 - 30 km in width steeply sloping

(d) the mountainous land, 1000 - 3000 meter above sea - level, 10 - 30 km in width, very steep and locally dissected

(e) the intramountainous plain, from 100 to 700 meter in elevation, almost level

(f) the southern hilly to mountainous land, ranging from 100 to 1000 meter in elevation, commonly dissected.

The western part of Central Java has almost no hilly land near its southern coast; an alluvial plain occurs there.

The field trip follows the main road Djakarta - Bogor - Tjiandjur - Bandung - Garut - Purwokerto - Wonosobo - Magelang - Jogjakarta and crosses the different landscapes several times. Further information on the land scapes present is given by the traverses attached to the respective maps at a scale of 1 : 250.000 (Fig. 5 - 14)

2. Climate.

In general, Java belongs to the wet tropical climate : high rainfall, high temperature with a wet and a dry monsoon period.

Due to its location close to Australia and its elevation ranging from 0 to 3000 meter above sealevel , there exist remarkable differences in climate from west to east and between the coastal, lowland and the mountains. To the east the climate become drier : the annual rainfall decreases from 2500 mm to 1000 mm : the dry season becomes more pronounced. In the surroundings of Bogor almost no dry months occur while 4 - 6 dry months are common in the eastern part. The Jogjakarta Area has 4 dry months.

With increasing elevation the annual rainfall increases from 2500 mm to 4000 mm, in some parts even up to 7000 mm are measured. Higher than 1200 m the rainfall decreases again.

The temperature decreases with 0,6°C/100 meter elevation ; in Djakarta the average day temperature is 27°C, in Bogor 25°C, and in the mountains temperatures of ± 20° C are normal. There is almost no difference between air temperatures in the wet and in the dry season.

The rainfall intensity decreases with the elevation, but the rainfall duration increases. The humidity at noon is about 90% in the western part of Java but decreases towards the east. The cloudiness increases with the elevation of the mountains, and is maximal at noon ; in the wet season clouds are equally distributed throughout the day.

Koppen classifies the climate as Af, Am and Aw types in the low to hilly lands and as Cf on the mountains.

Based on rainfall figures, Schmidt & Ferguson classify Java into A, B, C and D type zones.
(Figure - 4).

Table - 1 gives an idea of the climate of several regions along the route.

Table - 1 : Average annual rainfall and climatic type of several places along the route

No.	Place	Elevation (m)	Total annual rainfall (mm)	Total wet months	Total dry months	Rain fall Type (a)	Climate Type (b)
27	Djakarta	7	1793	9	6	C	Ama
46	Bogor	266	4230	12	2	A	Afa
163	Bandung	730	1778	12	5	B	Ama
156	Lembang	1247	2200	11	4	B	Af
206	Garut	710	2020	10	6	C	Ama
207	Waspada	1230	2473	11	6	C	Af
20A	Wangon	± 30	3005	11	4	B	Ama
26	Wonosobo	756	4247	12	5	B	Af
24B	Dieng	2000	3719	11	5	B	Cwi
53	Jogjakarta	113	2181	9	7	C	Ama
65	Woro	± 175	2410	9	7	D	Ama
76	Wonosari	210	1809	9	7	D	Awa
85	Getas	375	2693	11	6	B	Ama
19	Djatibarang	20	2252	9	7	C	Ama

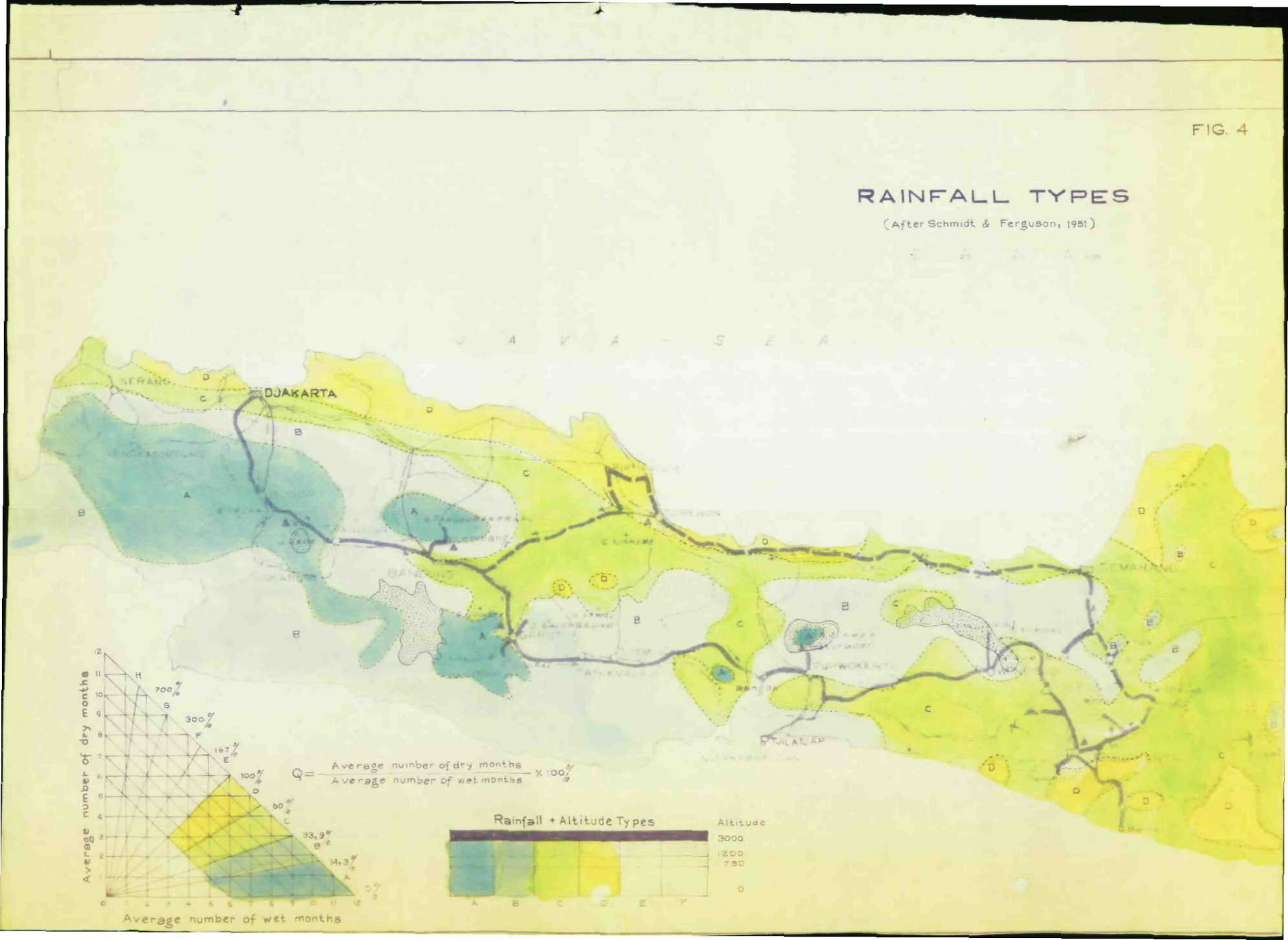
(a) Schmidt / Ferguson, 1951

(b) Köppen.

FIG. 4

RAINFALL TYPES

(After Schmidt & Ferguson, 1951)



. Geology

DJAKARTA - BOGOR - BANDUNG

Going up from Djakarta to Bogor one will notice immediately the reddish soil that occupies practically the entire distance. Only the trained observer will notice that the northern portion of Djakarta City is underlain by another type of soils. In fact, there are two soil types of quite different origin. Whereas the reddish soil is derived from the weathering of lahar material, that is mudflows of volcanic debris that once came down the Salak volcano, the soil of north Djakarta is coastal plane deposit.

Map - Ia

Bogor, about 270 meters above sealevel, is the natural portal to the highland of Priangan (literally "Place of the Gods"). Its localiton on the well-defined divide the rivers Tjiliwung and Tjisadane has made it the most appropriate entrance to the mountainous afea. To the southwest is Salak volcano with its dissected cone. It has not been active during historic time. The rocks are basalts and andesites.

From Bogor the road climbs up the cluster of volcanoes including Pangrango and Gede to the southeast.

Before Puntjak Pass is reached the road winds up through a hummocky landscape, presumably a prehistoric landslide, Warna Lake, now a nature reservation, was created by the slide. Mt.Gede is still active. Its most violent outburst during historic time took place in 1747-1748 at which time lava outflows took place. No details are available about that happening. Since then the eruptions are classified as "normal". The rocks of this volcano are andesite and basalt.

Map - Ia:

The road then descends to Tjiandjur Plain, an imperceptibly eastward sloping plain made up of lahar material coming down from the Gede volcano. The material on the other side of the Tjisokan Rivers is presumed to have come from the other direction, that is the mountains north of Bandung. This becomes definite in the surroundings of the Tjitarum River crossing at which place fine-grained, presumably lake sediments, are exposed.

Map - IIa :

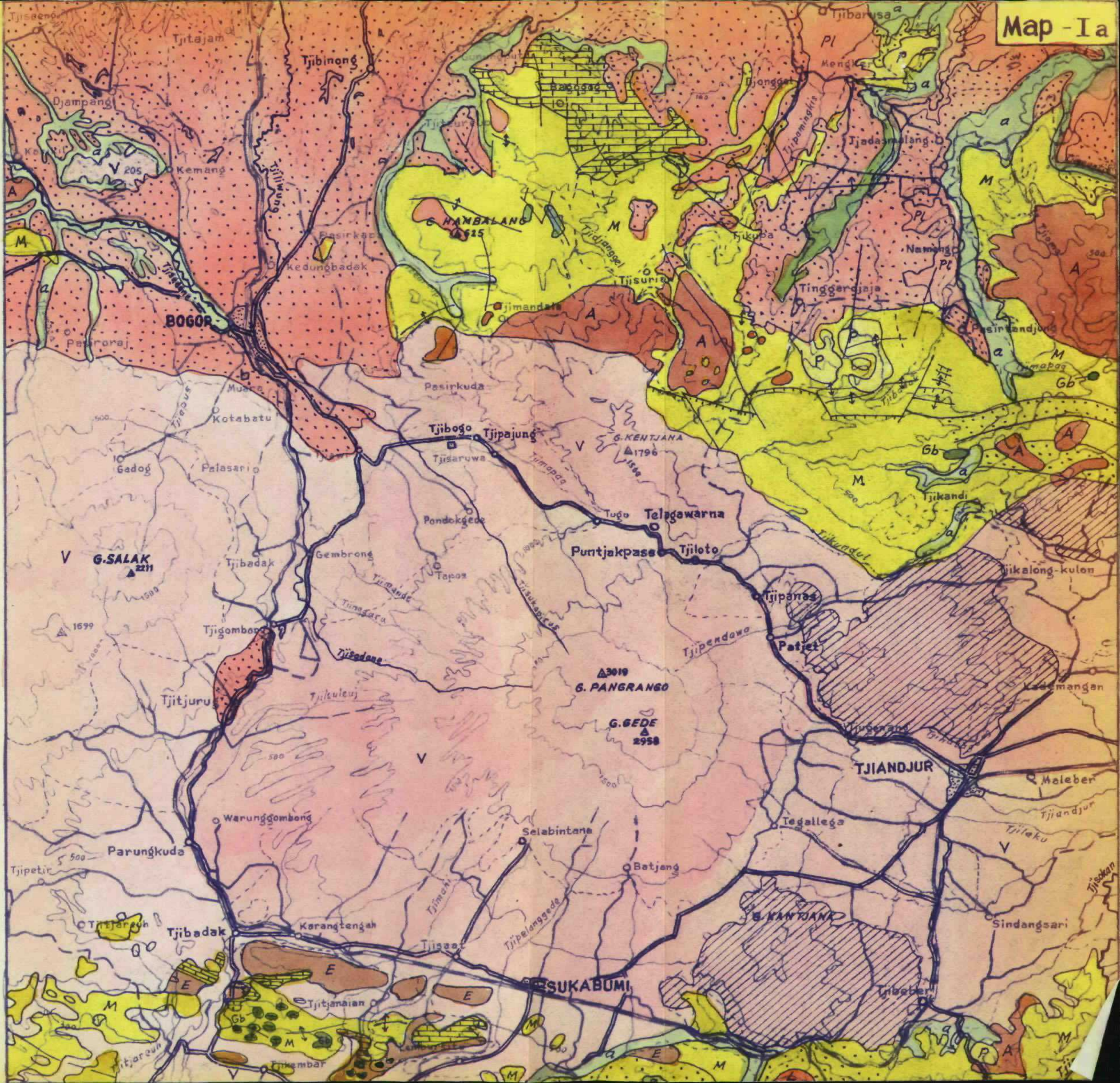
Then the road crosses Radjamandala Plain to wind up again later against the hills near Tagogapu. Along the road are exposed Tertiary sediments consisting of andesitic sandstones, conglomerates, marls and limestones. The latter form cliffs and isolated hills which are supposed to be huge blocks that have separated from the limestone layers and are virtually drifting away downslope. This stretch of road is indeed subjected to slumping and sliding every rainy season.

The base of the sedimentary pile consists of shales of Oligocene age.

Andesitic intrusions have been observed at several localities, the most important one of which is exposed near Tjisitu village.

Beyond Padalarang the landscape becomes different because of the relatively flat topography. We are now on the Bandung Plateau, a former lake bed.

Lake Bandung came into existence when huge amounts of material came down the Tangkuban Prahu volcano and blocked the outlet of the ancient Tjitarum River at a place northwest of Padalarang. The highest level attained by the lake was about 720 meters above sealevel. Later, a new outlet was formed near Ra -


Map - I a
Tjitajam
Tjibinong
Tjibarusa
Menglor
Djonggol
Djampang
Kemang
Tjiliwung
Tjipamingkis
Tjidjanggel
Tjadasmalang
HAMBALANG
Pasirkapa
Kedungbadak
Tjisuria
Tjikuba
Nameng
Tinggerdjaja
Tjimandala
BOGOR
Pasirkuda
Pasirtandjung
Tjimapag
Muara
Kotabatu
Tjibogo
Tjipajung
Tjisaruwa
G. KENTJANA
1796
Gadog
Palasari
Pondokgede
Telagawarna
Tugu
Tjikandi
Tjikundul
Puntjakpass
Tjiloto
Tjikalong-kulon
G. SALAK
2211
Gembrong
Tjibadak
Tapos
Tjimande
Tjipanas
Tjisukabirus
1699
Tjigombong
Tjipendawa
Patjet
Tjisadane
3019
G. PANGRANGO
Kademangan
Tjitjuru
Tjikuleuj
G. GEDE
2958
TJIANDJUR
Maleber
Tjiandjur
Warunggombong
Selabintana
Tegallega
Tjileku
Parungkuda
Tjipetir
Batjang
Tjimahi
Tjisokan
Tjitjareuh
Tjibadak
Karangtengah
Tjisaat
Tjipelanggede
G. KANTJANA
Sindangsari
SUKABUMI
Tjibeber
Tjitjanaian
Tjikembar
V
M
A
Pl
P
E
Gb
a

Map - IIa :

djamandala and gradually the whole lake was drained. No carbon dating has ever been made, but based on finds of imple - ments of stone age man and subsequent bronze age artifacts, Bandung Lake is thought to have existed less then 10,000 years ago, perhaps 3000 to 6000 years. Even now after heavy rains, several low-lying places in the Bandung plain are still inundated.

Before Tjimahi township is reached there is on our right-hand side a row of hills, oriented in an approximately north-south direction. Nearly all the rocks are augite-hypersthene-hornblende andesites.

BANDUNG - MT.TANGKUBAN PARAHU

The city of Bandung is built on an ancient delta of the Tjikapundung River at the time it debouched into Lake Bandung. The fan-like shape is indeed discernable on topogra - phic maps of appropriate scale (1:25,000).

Leaving Bandung in the direction of Mt.Tangkubanparahu, that is northward, the road runs along a ridge of tuffaceous material derived from the Tangkuban Parahu volcano, at the time it produced huge amounts of pyroclastics. This tuff material is a source for puzzolan: mixed with lime it is used as bricks.

Then, before Lembang township is reached, the road passes the Lembang fault which runs in an approximately east - west direction. On the fault scarp a layer of augite-hypersthene andesite is exposed, a rock type characteristic for Mt. Burangrang to the northwest and also Mt.Sunda, the predecessor of the present Mt.Tangkuban Parahu, which has produced

Map - IIa :

mostly basaltic material.

Lembang Plain, about 1240 m above sealevel, is the result of filling up with Tangkuban Parahu material of a depression created by the Lembang fault.

As can be seen in the field the area is covered by unweathered material. This is because Mt.Tangkuban Parahu belongs to the eruption in recent time is the one of 1846, at which time mud flows were produced which destroyed arable lands.

Mt.Tangkuban Parahu is one of the few volcanoes that is accessible by car. An asphalt-paved road leads to the crater rim (1832 m); from this place one can look to Kawah Ratu(Queen Crater), the most active of a series of craters which is present on this volcano. In fact, it is because of this row of approximately eastwest trending craters that has given rise to the naming of "Tangkuban Parahu", a canoe turned upside down.

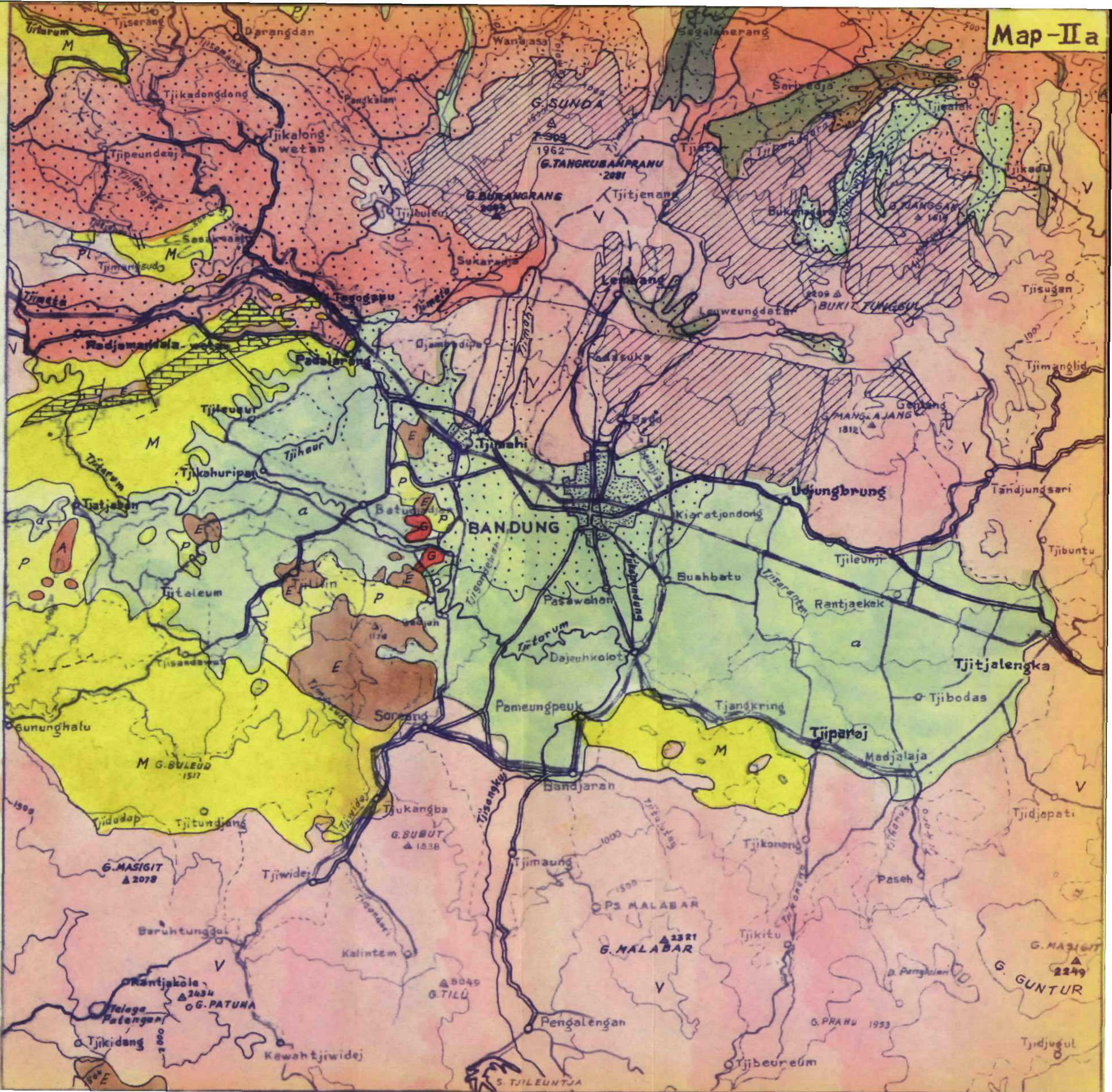
BANDUNG - GARUT

Back again in Bandung and then going eastwards one will notice again the gently southward sloping terrain which looks flatter farther away. The road leads along the northern periphery of the former lake bottom.

Some ten kilometers east of Bandung is the place where tiles and other earthenware are made from the lake sediments.

Map - IIIa:

Having passed Tjitjalengka township the road goes up a little bit to come later to another former lake, Nagrak Lake, at about 850 m above sealevel. Again the flatness of the



Map-II a
BANDUNG
Tjimahi
Lembang
Padalarang
Udjungbrung
Tandjungsari
Kiaratjondong
Buahbatu
Rantjaekek
Tjileunji
Tjitjalengka
Tjibodas
Tjiparaj
Madjalaja
Tjangkring
Dajeuhkolot
Pameungpeuk
Bandjaran
Soreang
Tjitaleum
Tjikahuripan
Tjileuwur
Radjamandala
Gununghalu
G. BULEUD 1517
Tjitundjang
G. MASIGIT 2078
Tjiwidej
Baruhtunggul
Kalintem
G. TILU
G. PATUHA
Rantjakole
Tjikidang
Kawahtjiwidej
Pengalengan
Tjibeureum
S. TJILEUNTJA
G. MALABAR 2321
Ps MALABAR
Tjimaung
G. BUBUT 1838
Tjikitu
Paseh
Tjikoneng
G. GUNTUR
G. MASIGIT 2249
Tjidjepati
Tjidjugul
Tjibuntu
Tjimanglid
Tjisugan
BUKIT TUNGGUL
G. MANGLAJANG 1812
Leuweunggdatar
G. SUNDA
1962
G. TANGKUBANPRANU 2081
G. BURANGRANG
Tjitjenang
Sukaradja
Tjikalong-wetan
Tjipeundeuj
Tjikadongdong
Darangdan
Wanajasa
Pangkalan
Sasakeaat
Tjimanisud
Tjimeta
Tagogapu
Segalaherang
Sariredja
Tjikadu
Bukanagara
G. TJANGGAK
Tjitarum
Tjisangkuj
Tjikapundung
Pasawahan
BANDUNG
a
M
V
E
P
G
A

Map - IIIa:

terrain is striking.

Then the road descends steeply to

THE VOLCANIC AREA OF GARUT - BALUBUR LIMBANGAN

which may be subdivided into the Plain of Garut-Leles and the Plain of Balubur Limbangan. The excursion will pass only the first-mentioned plain. This plain, which has an elevation of about 700 meters above sealevel, is bounded on three sides by volcanoes, some of which have erupted in historical time. There are indications that once this plain was drained to the south. Due to an eruption of the Papandajan volcano or a landslide in prehistoric time the outlet was blocked, and as a result an intermontane lake came into existence. At a later stage a new outlet was formed, this time to the north, thus changing completely the existing hydrographic regimen. The stream that drains this fertile plain is at present the upper course of the Tjimanuk river, one of Java's main rivers.

The volcanoes around the plain

Mt.Papandajan; Height 2622 m a.s.l.

Seen from the south this volcano looks like a simple cone. From the north, however, the picture is quite different. An ordinary crater is not to be found. Instead, there is a breach on the northeastern flank. The severest eruption in historical time took place the night of 11 and 12 August 1772, when the volcano, so to say, exploded. Apparently, the eruption was accompanied by the formation of glowing clouds. The number of people killed was 2957.

Map - IIIa:

The rocks consists of augite-hypersthene andesites, some of which contain small hornblende needles.

Before World War II this volcano has an observatory post, but it has been abandonned then.

Mt.Tjikuraj, Height 2821 m a.s.l.

Mt.Tjikuraj with its beautiful cone has never been active in historical time. Its rocks are of andesitic composition.

The Guntur volcanic cluster

This cluster consists of several cones, though none of them possesses a beautiful shape. The one considerated active is Mt.Guntur (1956 m a.s.l., 1288 m above the plain of Garut). Within the period of 1800-1847 not less than 21 eruptions were recorded, the most severe were those of 1818-1825, and 1843. What can be seen from the main road is the lava stream of May 23, 1840. There are many hot springs at its terminal, which are now used by the Tjipanas bathing resort (see Appendix I).

The rock of the 1840 lava stream is basalt. Elsewhere andesites are more common.

Mt.Galunggung, Height 2168 m

This volcano has a peculiar shape in that its crater is open to the east. By one reason or another the east wall has collapsed and the material from the east flank is scattered on the plain of Tasikmalaja. According to ESCHER (1925) was later remodelled into small hillocks with height varying between 10 meters or less and 70 meters. Earlier, the area was

Map - IIIa:

called by JUNGHUHN the Country of the Ten Thousand Hillocks.

According to GORSKOV (personal communication), however, rupture of the wall might have been caused by a tremendous blast in the same way as the eruption of Mt.Bezymianny, Kamchatka, in March 30, 1956.

The recorded eruptions are those of 1822, 1894 and 1919. Since then practically no extraordinary activities have taken place. The eruption of 1822 was accompanied by the ejection of glowing clouds which were directed toward the east and reached the other bank of the Tjitanduj River. The eruption of 1894 caused the formation of lahars which flowed along the rivers Tjikunir, Tjibandjaran and Tjikunten, the eruption of 1918 was associated with the formation of a lava dome.

The rock of the top of the volcano consists of basalt and olivine-containing augite labrador andesites; the lava dome of 1918 is augite-hypersthene andesite.

Mt.Talaga Bodas, Height 2201 m a.s.l.

Together with Mt.Galunggung, this volcano which is in a solfataric stage, forms a volcanic complex. It has a lake with high-grade sulphuric mud. No eruptions have been recorded is historical time.

Mt.Haruman (Height 1218 m a.s.l.) and Mt.Kaledong (Height 1240 m a.s.l.)

These two solitary cones on the plain of Garut Leles are built up of basalts. Judging from their shape, they must be of very recent age.

Map - IIIa:

GARUT - TASIKMALAJA - PURWOKERTO - WONOSOBO

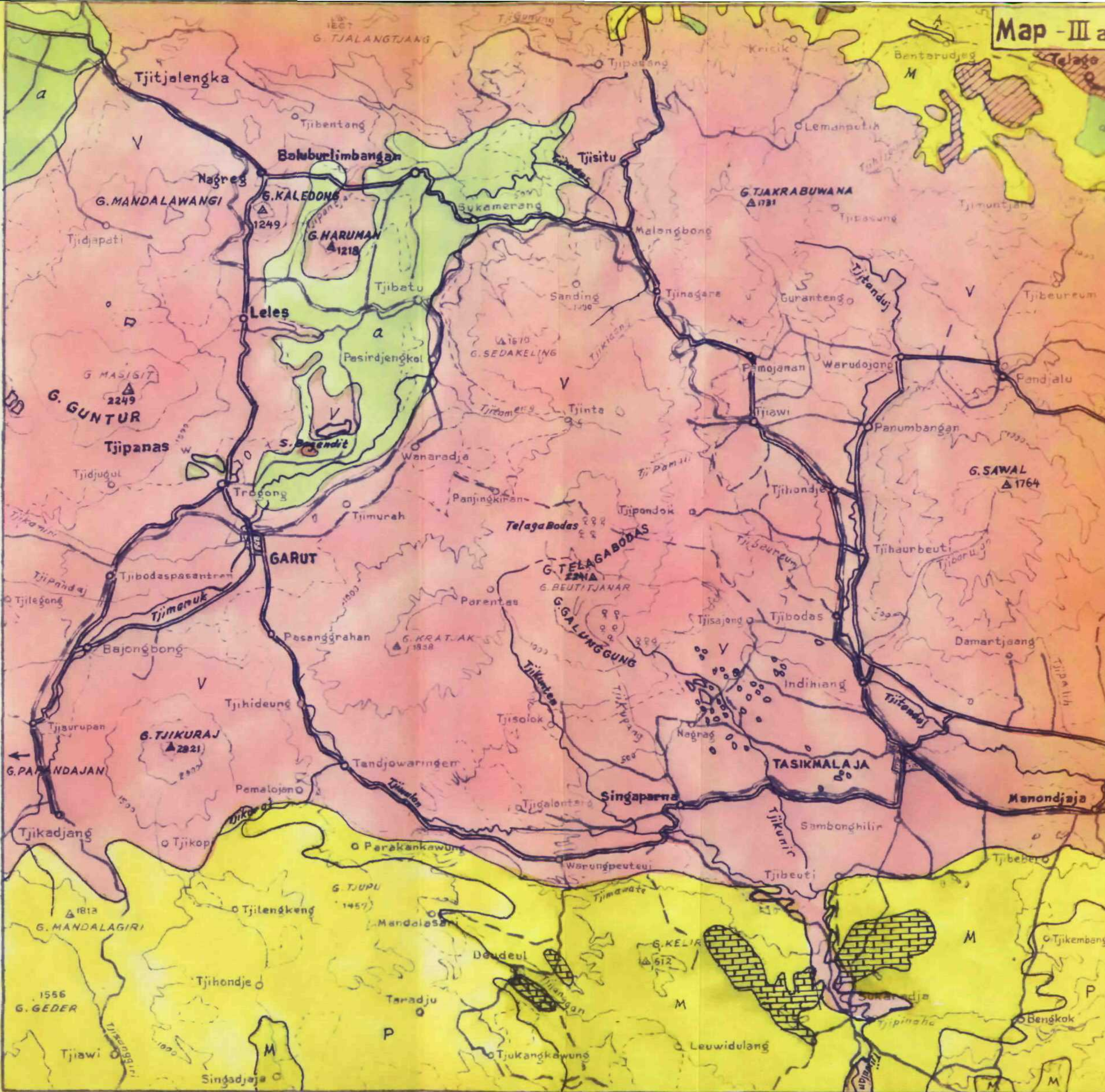
Going eastwards from Garut the road which is full of turns is out into the relatively steep right-hand valley wall of the Tjibulan River. As a result, the road has been blocked several times by landslides. Once, because of such a slide a complete relocation of the road was necessary.

Between Singaparna township and Tasikmalaja City one will notice immediately the strangely distributed hillocks. We are in the "Country of the Ten Tousand Hillocks" mentioned above. On closer examination in one of the quarries, we will see that a substantial part of the rock consists of lava either in blocks or massive.

Between Tasikmalaja and Bandjar the area is covered by lahar material. Especially between the two latter places the soil is reddish, thus pointing to an older age. The material must have come from the volcanoes in the surroundings, such as Mt.Tjakrabuana, Mt.Sawal and the presently still active Mt.Galunggung.

After Bandjar the landscape becomes immediately different. In fact, Bandjar is located on the boundary of a tectonic block, the South West -Java Block, east of which is an area which has undergone a subsiding movement in a relatively recent geologic time. As a result, large portions of the subsided area are now occupied by low-lying plains which are sometimes swampy for part of the year.

A substantial part of the plain has been converted into wet rice fields.


Map -III a
Tjitjalengka
Balubur limbangan
Nagreg
G. KALEDONG
1249
G. MANDALAWANGI
G. HARUMAN
1218
Tjidjapati
Tjibatu
Leles
Pasirdjengkol
G. MASIGIT
2249
G. GUNTUR
Tjipanas
S. Bagendit
Wanaradja
Tjidjukul
Trogong
Tjimurah
GARUT
Tjibodaspasantren
Tjimenuk
Bajongbong
Pasanggrahan
Tjihideung
Tjisurupan
G. TJIKURAJ
2821
G. PAPANDAJAN
Tandjowaringen
Pemalojan
Tjikadjang
Tjikop
G. TJALANGTJANG
Tjibentang
Sukamerang
Tjisitu
Malangbong
Kricik
Lemahputih
Bentarudjeg
Telaga
G. TJAKRABUWANA
1731
Tjiparang
Sanding
G. SEDAKELING
Tjinagara
Gurantengo
Pamojanan
Warudojong
Pandjalu
Tjiawi
Panumbangan
Tjinta
Panjingkiran
Tjipondok
Telaga Bodas
G. TELAGABODAS
G. BEUTI TJANAR
G. GALUNGGUNG
Parentas
G. KRATJAK
1838
Tjisajong
Tjibodas
Tjihondje
Tjihaurbeuti
G. SAWAL
1764
Tjibeureum
Damartjaang
Indihiang
Tjitanduj
Tjisolok
Nagrag
TASIKMALAJA
Singaparna
Tjigalontang
Manondjaja
Sambonghilir
Tjikunir
Parakankawung
Warungpeuteuj
Tjibeuti
Tjibeber
G. TJUPU
1457
Tjitengkeng
Mandalasari
1813
G. MANDALAGIRI
Deudeul
G. KELIR
612
Tjikembang
1556
G. GEDER
Tjihondje
Taradju
Sukaradja
Bengkok
Tjiawi
Tjukangkawung
Leuwidulang
Singadjaja

Map - IV a: *vlei rosce*

The area between Madjenang and Tadjum is occupied by Middle and Upper Tertiary rocks, ranging between volcanis and fine-grained sediments. The Tadjum River flows along a valley which is too big for it. High and low terrace can be distinguished. A theory has been postulated that at one time the Seraju River flowed through this valley.

Purwokerto, 100 m above sealevel, a city lying on the southern slope of the Slamet volcano a mountain resort. The rocks of which are andesites and basalts.
Between Purwokerto and Wonosobo the road runs along the broad Seraju valley, the southern boundary of which is an inferred fault. The whole valley floor is covered by lahars and other volcanoes from several sources.

WONOSOBO - DIENG

For various reasons the Dieng Plateau is interesting. This plateau, about 2000 meters above sealevel, is bounded by a number of Quaternary volcanoes: Mt.Prau, which is the oldest, Mt.Pakuwadja, Mt.Kendil, Mt.Pangonan and Mt. Sipandu. In this area of 1.5 x 2.5 km there are several lakes, Warna Lake, Pengilon Lake, Terus Lake, Balekambang Lake, Lumut Lake. Warna Lake and Pengilon Lake are separated by a ridge formed by a lava flow which originated from Mt.Kendil. Both lakes and also Terus Lakes have come into existence because of the damming up of Tulis River by a lava flow. Lake Merdada, located beyond the Dieng Plateau proper, is a maar (explosion vent).

Most rocks of the Dieng are andesitic in composition, some are basaltic.

Map - IVa:

About a thousand years ago (Caka 731, A.D. ± 810) this plateau was an important site of Hindu-Javanese culture. The temples, bearing the (modern) names of Tjandi (Temple) Ardjuna, Tjandi Semar, Tjandi Srikandi, Tjandi Puntadewa, etc., are a testimony of the glorious past. When the site became swampy efforts were made to drain it in a northweastern direction by means of a tunnel, which, curiously enough, still conveys water. This so-called "Aswatama tunnel", then, is an example of the ingenuity of the ancient residents of this plateau.

A mushroom industry recently started here is encroaching upon the historic area.

The Dieng will perhaps experience another enlivening in the very near future, for a decision has been made to start the first drilling for natural steam or hot water. If successful, a geothermal power plant will be erected.

WONOSOBO - MAGELANG - BOROBUDUR - JOGJAKARTA

From Wonosobo to Magelang the road first climbs up the mountains until it reaches Kledung Pass (1405 meters a.s.l), the saddle between Mt.Sundoro and Mt.Sumbing, a twin volcano, both having a rather well-developed cone shape. The rocks of both mostly augite andesites with some basalts. Between Parakan and Temanggung there are scattered some hundred hillocks. VAN BEMMELEN (1941) presumes these hillocks of augite-olivine basalt and augite-hypersthene andesite to have originated in the same way as have been the Ten Thousand Hillocks between Singparna and Tasikmalaja, West Java, even though a scar like that on Mt.Galunggung is not to be found on Mt.Sundoro.

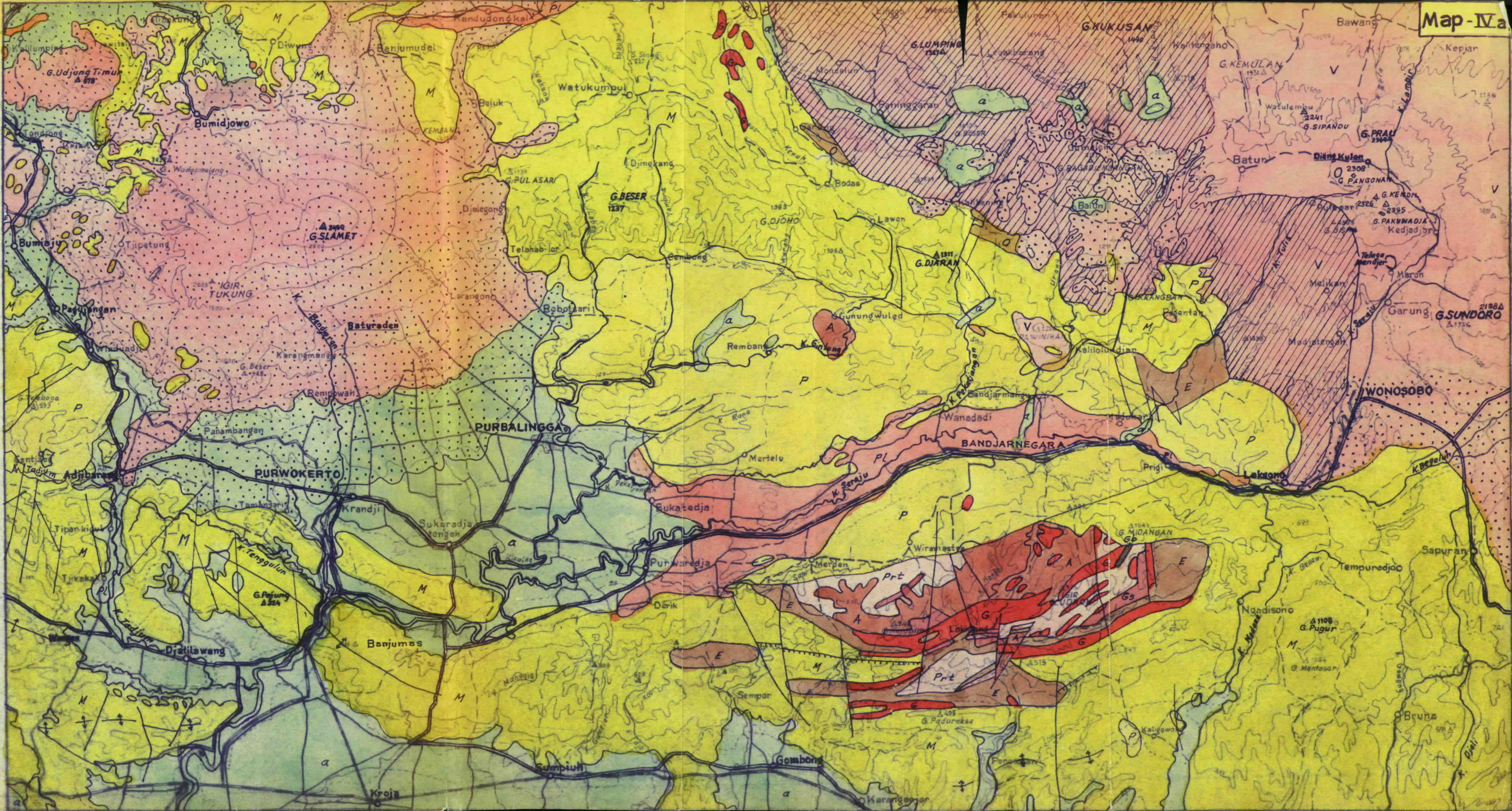
Map - IVa:

Before reaching Magelang one will observe from afar a solitary hill, Tidar Hill. The area between Magelang and Setjang to the north is underlain by lava flows, which are exposed along the Progo River to the west and the Elo River to the east. There are indications that at one time the latter river jointed the first mentioned one somewhere north of Magelang. Because of those lava outflows, presumably issuing from a fissure, the Elo River was forced to change its course and jointed the Progo farther downstream. Tidar Hill, then, came into existence when, after the lava outflows, loose material, mostly ash and lapilli, was deposited. In fact, a crater-like depression is still discernable from the west side. There are other indications such as the youthful valleys of the Progo and Elo rivers and the still unweathered soil around Magelang, that point to the relatively recent age of this happening, perhaps less than a thousand years ago.

Map - Va:

Borobudur, an impressive monument from the past, was built some 1100 years ago a top a hill. This Budha shrine is now facing deterioration on account of tilting and sagging and also because of growth of mosses, algae and lichens on the stone surface. UNESCO together with a number of foreign countries have stepped in with financial aid and expertise to safegaurd this unique structure. A reduction of the moisture content of the stone, cleaning of the surface, and improvement of the foundation will be required to conserve Borobudur.

According to W.O.J. Nieuwenkamp, Borobudur was built on an island in a lake or near lake. There are indeed indi-



Map-IVa
G. KUKUSAN
G. LUMPING
G. KEMULAN
G. SIPANDU
G. PRAU
Diëng Kulon
G. PANGONAN
G. PAKUWADJA
Kedjadjar
G. SUNDORO
Garung
WONOSOBO
Bawang
Kepjar
Watukumpul
Banjumudal
G. Udjung Timur
Bumidjowo
G. PULASARI
G. BESER
G. DJOHO
G. DIARAN
G. SLAMET
IGIR TUKUNG
Baturaden
Bumiaju
Pagiljangan
Gunungwuled
Rembang
K. Sinkeng
PURBALINGGA
PURWOKERTO
Adjibarang
BANDJARNEGARA
Wanadadi
Bandjarmangu
Lekseno
Prigi
Sukaredja
Krandji
Sukaradja
Purwaredja
Banjumas
Djatilawang
G. MIDANGAN
G. Pugur
Sapuran
Tempuradjo
Ngadisono
Bruno
Sempor
G. Paduresso
Sumpiuh
Gombong
Kroja
K. Serayu
K. Tenggulun
G. Pojung

Map - Va:

cations that support this theory, among which the break in the longitudinal profile of the Progo River several kilometers downstream from Borobudur.

The last hop to Jogjakarta will lead almost entirely through Merapi material.

MT. MERAPI

Merapi (literally meaning "Fire Mountain") volcano, 2947 meters high, is one of the most active volcanoes in the world with a period of dornancy between 1 - 5 years. It is in an approximately north-south trending row of volcanoes, which consists of Mt.Ungaran, Mt.Telomojo, Mt.Merbabu, and Mt. Merapi. An older and a younger Merapi can be distinguished, with rocks of respectively basaltic and andesitic composition.

Typical for Mt.Merapi are "lahars", that is mud flows derived from eruption material; and "ladus" or glowing clouds. Lahars are sometimes very destructive. Glowing clouds my reach distances of more than 10 kilometers, destroying everything on their way. Because of the dense population and the nature of this volcano, Mt.Merapi is classified as a "dangerous volcano". This is also one of the volcanoes in Indonesia which has a permanent warning system. Six Volcanological Observation Stations present around Mt.Merapi are equipped with meteorological, seismological and other instruments.

Several years ago a "Volcanic Debris-Control Project" was instituted to coordinate all measures to fight any eventuality of the consequencies of volcanic eruption to minimize loss in life and property.

Map - Va:

JOGJAKARTA - BARON

The road from Jogjakarta to Baron on the south coast is full of changes. Starting from the fertile plain of Jogjakarta whose soil is derived from Merapi material, the road all of a sudden winds up against the cliff of the tectonic block of the Southtern Mountains of Miocene formations of andesitic volcanics, sandstones, tuffs etc., one will come to the relatively flat area of Wonosari which is underlain by limestones and marly limestones. To the south is the area with the typical karst morphology, elsewhere called "cockpit karst" or "cone karst". FLATHE and PFEIFFER (1965) have proposed the name of "sinus karst".

Something typical for the karst area is the lack of surface drainage. As a result, this area suffers from shortage of water. Once a windmill was installed near Kemadang village, but the result was unsatisfactory. Also maintenance of the windmill was not easy. For most people in this area the "telagas" (ponds) are the only place where they can get their domestic water.

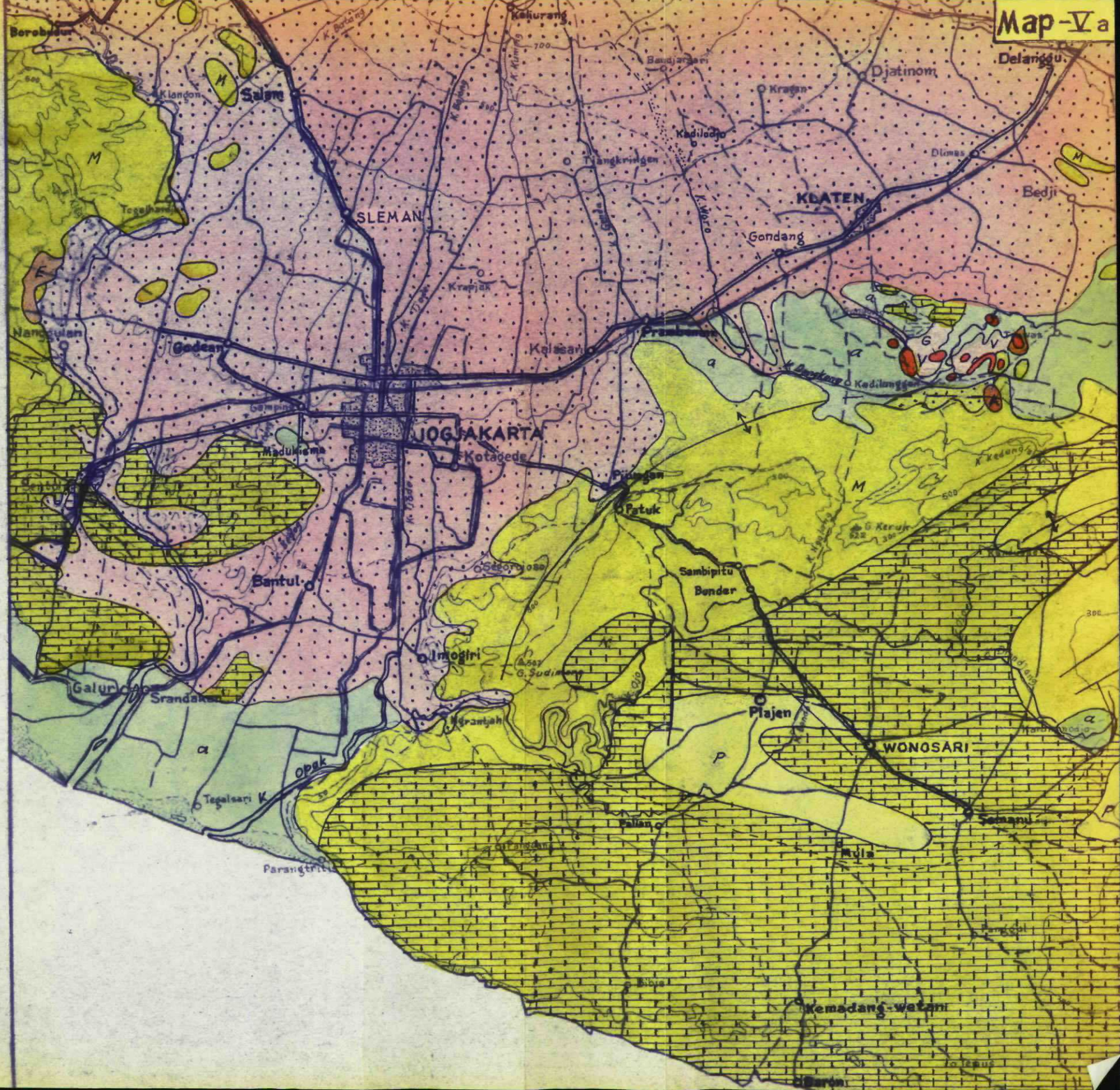
Whereas the surface of the land is dry, the subterranean flow of water may attain tremendous amounts. The "spring" near Baron, for example, is reported to have a minimum yield in the dry season in the excess of 400 liters per second.

Appendix I

Chemical analyses of the mineral waters of Tjipanas (I) and Baturaden (II); Constituents in milligrams per liter (Purho-Hadiwidjojo, 1968)

	I	II	
Ca	68.6	64.3	248
Mg	-	107.5	204
Na	298.3	105.5	139
K	298.3	35.5	392
Fe	-	tr.	1.1
Mn	-	tr.	0.22
Al	132,3	-	-
HCO_3	-	353.9	976.0
CO_2	305	727.7	-
SO_4	870.0	463.6	497
Cl	108.0	60.5	730
Br	-	-	-
I	-	-	-
F	-	0.5	-
NO_3	-	0.0	7.3
NH_4	-	tr.	0.0
HPO_4	-	-	-
H_2S (lab.)	-	-	0.0
SiO_2 (tot.)	121	110	240 (?)
Temp.(air) °C	-	n.d	23.3
Temp.(water) °C	44	45.5	47
pH	-	5.0	6.1
Total H	-	34.0	81.0

n.d. = not determined


Map-V a
Borobudur
Kalurang
Delanggu
Djatinom
Salam
Klangon
Bandjarsari
Kragan
Kadilodjo
Tjangkringan
Dimas
Bedji
KLATEN
SLEMAN
Gondang
Tegalhanggo
Krapjak
Nanggulan
Godean
Kalasari
Prambanan
Kadilangu
JOGJAKARTA
Kotagede
Madukisma
Pundong
Patuk
G. Keruk
Sambipitu
Bonder
Bantul
Imogiri
Galur
Srandakan
Pjajen
WONOSARI
Opak
Tegalsari
Semanu
Paranggritis
Kemadang-wetan

LEGEND

GEOLOGY MAP I-II-III-IV-V

a	Alluvium	Holocene
	" , volcanic facies	
V	Undifferentiated volcanic products	Quaternary
	Young Quaternary " "	
	Old " " "	
Pl	Pleistocene, sedimentary facies	Pleistocene
	" , volcanic "	
P	Pliocene , sedimentary "	Pliocene
	" , volcanic "	
M	Miocene , sedimentary "	Miocene
	" , limestone "	
	" , volcanic "	
O	Oligocene	Palaeogene
E	Eocene	
Prt	Pretertiary sediments	Pretertiary
G	Granite (G), Granodiorite (Gd), Diorite (D)	
Gb	Gabbro(Gb), Peridotite (P), Serpentine (S)	
L	Liparite (L), Dacite (Da)	
A	Andesite (A), Basalt (B), Diabase (Di)	
Gs	Crystalline schists	

Anticline

Fault

Overthrust fault

4. Soil

En route from Djakarta to the inland (Bogor, Bandung, Jogjakarta) one may distinguish the following major soil groups: Alluvial soils, Regosols, Andosols, Grumusols, Rendzinas, Mediterranean Soils, Latosols and Red-Yellow Podzolic Soils. The general description of each group is given in the following.

Each group is represented at the respective sites shown in the following table - 3 :

Table - 3. Representation of each major soil group on the respective site number(s)

Major Soil Group	Map I	II	III	IV	V	x	Total
Organosol	-	-	-	11a	-	-	1
Alluvial	-	-	-	11a	-	-	1
Regosol	-	-	6a 9	- -	12a 13a 16 18d	-	6
Andosol	-	3a	-	-	-	-	1
Grumusol	-	-	-	-	18b	21	2
Rendzina	-	-	-	-	18a	-	1
Mediterranean	-	-	6c	-	18c	-	2
Latosol	2	-	6b	-	-	-	2
Red-Yellow Podzolic	-	-	-	-	-	-	-
Total	1	1	4	2	7	1	16

x = Route map.

Organosols

These soils are formed in organic matter debris. Depending on the origin and on the degree of decomposition of the organic matter the organosols can have a fibric, hemic or sapric character. In Indonesia they occur in the low land and also in river basins and depressions of the terrain.

The profile is $\geq$ 50 cm thick and consists of $\geq$ 30% Organic matter. The color is brown to dark brown they feel soapy between the fingers. The water holding capacity is high. Shrinkage is ussually irreversible. These soils are very susceptible to fire and wind erosion when dry.

The chemical features vary from eutrophic to olygotrophic. The organosols from Java are mainly eutrophic; those from Sumatra and Kalimantan oligotrophic. Admixtures of volcanic ash are very common on Java.

Organosols from Java constitute good agricultural land (Rawa Lakbok, passed between Bandjar and Wangon at the 25th of July). On the Dieng plateau (Site 11a) the climate seems to govern agriculture.

Organosols from the lowlands of Sumatra and Kalimantan can be reclaimed provided that the water can be controlled. Pineapple and cassava are the most common crops planted. These Organosols are usually underlain by sulfidic materials. If the organic surface layer is removed, wet rice field is therefore the best landuse.

Alluvial Soils

Alluvial soils have no or only weak profile development. They are formed in alluvial material of variable origin and character. They occur all over Indonesia.

Due to large differences in their formation alluvial soil have a wide range of physical and chemical characteristics (See table - 14, - 16).

Depending on the water conditions and chemical properties these soils are used in a wide range of landuse. They constitute the most productive soils in East Java as well as the least productive ones in the plains of Sumatra and Kalimantan. Rice can often be planted twice a year on these soils.

Regosol

These soil have little or no profile differentiation. According to the kind of their parent material these soils are subdivided into Regosol from eolian deposits, Regosol from volcanic ash and Regosol from colluvial material.

Regosols are coarse to medium textured (sand to loam). They have a very broad range of features and occur in different climatic conditions and over a wide range of elevation; they form in unconsolidated parent material.

Regosols from eolian deposits are found in a strip along the coast. Those formed from colluvium material occur in hilly regions and Regosols from volcanic ash (Site 12, 13, 16) are widely spread around young volcanoes (See table - 9, - 13, - 17, - 19).

Regosols along the coast, where the water table is not too deep, are covered with coconut plantations; in areas with adequate rainfall these soils may be used for pineapple growing.

Regosols derived from medium and fine textured volcanic material are terraced and used for irrigated rice at altitudes of less than 1000 m above sea level. Tobacco, sugar cane, soybean sweet potato and other crops are planted after rice.

Andosol

The soils are characterized by a 1 - 15 cm thick layer of acid mor. They have a 10 - 30 cm thick dark brown to black very humous surface layer underlain by a brown to yellowish brown subsoil. The profiles are usually of medium depth (less than 150 cm). The soils are porous and very friable; they have a high waterholding capacity and are smeary when rubbed. Fragipans occur occasionally at different depths; they are normally pumaceous, gritty, coarse textured and have yellowish colours. Burried profiles are very common (Site 3).

The soils are medium to light textured, with a crumb to granular structure in the surface layer, a low bulk density and a high silt to clay ratio (clay 10-40% and silt 40-75%). The organic matter content of the surface soil (A_1) ranges from 10 to 30% and that of the subsoil (B) from 2 to 8%. The pH is weakly acid and increases slightly with depth. The cation exchange capacity ranges from 20 to 30 me/100 g clay. The clay fraction consists of allophane, metahalloysite and gibbsite (See table - 8, - 11).

Andosols are found in a temperate climate, usually above 1000 m elevation with humid to perhumid conditions. In regions with a monsoon climate they occur at higher elevations.

They are also found on undulating volcanic fans. The parent material consists of intermediate to basic volcanic ash/tuff.

The original vegetation consists of high mountain forest which are now in many areas replaced by estate crops (Arabica coffee, tea, cinchona, tobacco), horticultural crops (vegetables and flowers) and industrial forest trees (Pinus merkusii, Eucalyptus and Agathis alba).

Grumusols

Grumusols have normally an AC profile. The profiles are usually less than 100 cm deep. The surface

horizon consists of a thick, black to dark grey layer, relatively poor in organic matter. The structure of the surface horizon is blocky, composed of prismatic peds. Usually the profiles are topped by a strong granular structure or crust. The soils are extremely plastic and sticky when wet, whereas they shrink on drying to form wide deep cracks. Intensive churning of the soil leads to the formation of slickensides. Some grumusols have a market accumulations of calcium carbonate concretions or filaments deep in the profile. Iron concretions are often found throughout the profile (Site 18b).

The soils are medium to heavy textures (clay contents from 35-80%. The soil reaction is neutral to alkaline (pH = 6.5-8.0). Base saturation is geneally over 50%, and increases with the depth; the complexes are mainly with Ca and Mg. The base exchange capacity is 50-100 me/100 g of clay. The clay fraction is mainly montmorillonitic (nontronite) (See table - 21, - 23).

Grumusols are found in monsoon climates, with 4-8 dry months. Most of these soils occur in flat to undulating regions where surface drainage and lateral inflow of groundwater from adjacent upland favour the accumulation of bases and silica.

The parent material is usually of basic composition, such as marls, calcareous alluvium, lacustrine deposits, and basalts.

Where irrigation is practiced, grumusols are intensively cropped with rice, often in rotation with sugarcane. In the rainfed parts, upland rice, maize and soybean are grown. Tobacco, kapok and teak are commonly found on these soils.

Rendzinas

Rendzinas are formed on upland of soft limestone and marls. The profiles are usually irregular in depth, but always shallow.

The surface horison has a dark grey to black color. In a rather dry climate such as in Wonosari (Site 18a) the color is grey. The subsurface layer is usually the parent material as well.

The texture is loamy clayey, the surface horizon has a granular to massive structure. The soil reaction of the surface soil is slightly acid but increases sharply to neutral or alkaline. Due to admixtures of volcanic ash, the surface soils are usually rich in plant nutrients (See table - 20).

Because of the irregularity and shallowness of these soils forest seems the best kind of landuse.

Mediterranean Soils

The normal horizon dustribution in Mediterranean Soils is: A_1, (A_3), B_{2t}. The A_1 horizon may be weakly

developed, this horizon is somewhat darker and browner than the B_{2t} horizon. The B_{2t} has a blocky structure with moderate to strongly developed clay coatings. On drying, the soils crack into medium sized blocks with a hard to very hard consistency. The soils are fine textured. The reaction is slightly acid to neutral (pH = 5.6-7.0). Base saturation is generally over 50% and increases with the depth. The base exchange capacity ranges from 20 to 50 me/100 g clay. The clay fraction is mainly kaolinitic with small quantities of goethite and hematite (See table - 12; - 22).

Mediterranean Soils are found in climates with a propounced dry season. In the lower region these soils are found to occur side by side with Grumusols. The parent materials are limestone, marl, and basaltic/andesitic tuff.

The shallow sloping phases are used for extensive grazing; on the deeper phases dry rice is planted (Site 18c). Where rainfall is adequate, dry farming is practiced (vegetables, fruits and a wide variety of other crops).

Latosols

Latosols are deeply weathered, strongly leached soils, without pronounced horizon differentation, with a low content of primary minerals and nutrients, with a relatively low content of organic matter, and with a high aggregate stability. The normal horizon distribution is A_1 - A_3 - B.

The soils have a fine texture; the structure of the B horizon is crumb to fine subangular blocky with a friable to rather firm consistence. There is little or no clay migration in the profile, but some discontinuous clay coatings and patches of firmer consistence may develop, mainly in Reddish brown to Red Latosols.

The reaction is acid to slightly acid (pH = 4,5-6,5), the base saturation ranges from 20-60%. The sorptive capacity is normally under 20 me/100 g of clay. The clay fraction is dominated by kaolinite and small amounts of goethite (See table - 7, - 10).

Latosols are commonly found in regions with a humid climate and with no distinct dry season (less than 4 months). Topographically, they occupy on well drained sites in undulating to hilly land, from 25 to 1000 m.

Occasionally they are found at higher elevations where they may from a transition to Andosols (Site 2 in Waspada).

Although they are chemically poor, many latosols are productive because of their excellent physical properties, (deep and resistant to erosion). These soils are widely terraced for irrigated, and rainfed rice and for other food crops (such as peanut, corn, sweet potatoes, soybean), fruits (papaya, citrus, bananas, durian, salacca) and industrial crops (rubber, tea etc.).

Red-Yellow Podzolic Soils

These soils are well developed and highly leached. The normal horizon distribution is A_1, A_2, A_3, B_{2t}, usually with weak A_1 and A_2 horizon. The B_{2t} horizon has a colour of high chroma varying from red to yellow, and a blocky structure, clay coatings on the soil peds, a low aggregate stability and a low permeability. The profile often contains laterite as concretions or as a continous layer, mainly developed in the lower B horizon or in the weathering zone below.

These soils are medium to heavy textured. The reaction is very acid to acid (pH 4.0-5.5). Base saturation is generally low (20%). The base exchange capacity averages some 25 m.e/100 g of clay. The dominant clay mineral is of the kaolinitic type, with little or no illite or montmorillonite.

The Red-Yellow Podzolic Soils are found in regions without pronounced dry months; they occur on weakly undulating to montainous land. They are formed mostly from siliceous non-volcanic material (marls, sandstone , shales etc.).

These soils are very poor in nutrients and highly susceptible to erosion. Large areas are covered by alang-alang or used for rubber.

5. Landuse.

The conditions of Java such as fertile soils, enough water, all the year sunshine and more than sufficient manpower enable to grow many food and industrial crops. A general picture about the acreage of landuse on the 13,4 million ha area of Java is as follows :

Table - 4 : Acreage of landuse in Java (x 1000 ha)

Type of landuse \ Province	DCI Djakarta	West Java	Central Java	D I Jogjakarta	East Java	Total
(1) Irrigated rice field						
-Technically	6,2	260,3	395,6	1,2	576,2	1239,5
-Semitechnically	17,1	408,6	149,9	21,9	320,3	917,8
-Simple (village)	-	319,6	183,8	38,5	-	541,9
Total irrigated	23,3	988,5	729,3	61,6	896,5	2699,2
(2) Other rice field (lowland, tidal, etc)	-	-	94,2	-	-	94,2
(3) Rainfed	7,9	131,0	189,7	-	294,7	623,3
Total wet rice (1+2+3)= x	31,2	1119,5	1013,2	61,6	1191,2	3416,7
(4) Dry field	20,5	861,4	783,3	124,1	1228,0	3017,3
(5) Garden	-	727,4	581,2	67,7	504,6	1880,9
Total arable land (x+4+5)	51,7	2708,3	2377,7	253,4	2923,8	8314,9
(6) Estate	1,0	360,0	58,0	-	164,0	583,0
(7) Forest	1,0	945,0	658,0	17,0	1343,0	2964,0
(8) Others	5,5	901,2	341,6	38,6	255,8	1042,7
Grand total	59,2	4914,5	3435,3	309,0	4686,6	13404,6

Sources : See next page.

Sources : Rice field data from the Dept. of Public Works 1970.
Dry field data from the Directorate General of Agriculture, 1969.
Forest and other data from the Directorate General of Forestry, 1970.

The distribution of landuse appears on map Fig. 15.

Based on the acreage of harvested crops on sawah and dry arable land in 1970 roughly the crop intensity per province is as follows.

Table - 5 : Crop intensity on sawah and dry arable land (1970)

	Sawah	Dry arable land
DCI Djakarta	0,43	0,94
West Java	1,40	0,86
Central Java	1,22	1,10
D.I. Jogjakarta	1,44	1,18
East Java	0,98	1,31
Java (average)	1,09	1,08

Note : Data on sugarcane, tobacco, cotton, etc. are not included.

Data collected on planted area per Kabupaten (regency) represent a better crop intensity picture than the data in harvested areas and it gives also a more specific picture for the respective Kabupaten than the province data.

Table - 6 indicates :

a. the more to the east, the higher the crop intensity on sawah landuse.

b. the better the soils and the more water available, the more crops can be grown.

Table - 6 : Crop intensity on sawah fields for the Kabupaten crossed along the route from west to east

Kabupaten	Major Soil group(s)	Rainfall type (S/F)	Elevation of rice fields (meter)	Crop intensity
(1) Bogor	L,Re	A	200-1000	123
Tjiandjur	L,G	A,B	100- 500	118
Sukabumi	L	A,B	500-1000	128
Bandung	L,A	B,C	400-1000	134
Garut	L,M,Re	(A)B,C	500-1000	154
Tasikmalaja	Re,L	B	200-1000	173
(2) Banjumas	L,Re	B,C	100-1000	176
Purbolinggo	Re,L	B	100-1000	177
Bandjarnegara	L	(B),C	500-1000	151
Wonosobo	Re,An	B,(C)	700-1000	124
Magelang	A,L	C	100-1000	132
(3) Sleman	Re	C	50- 600	208
Bantul	Re	(C),D	20- 100	195
Kulonprogo	Re,G	C,(D)	20- 200	152
Gunungkidul	M,G	C,(D)	50- 300	184

A=Alluvial; Re=Regosol; G=Grumusol; An=Andosol; M=Mediterranean; L=Latosol. S/F=Schmidt/Ferguson. (1)=West Java; (2)=Central Java; (3)=D.I.Jogjakarta.

The landuse on dry field is less intensive except for Gunungkidul area. At higher elevations more crops seem to be grown than at lower ones.

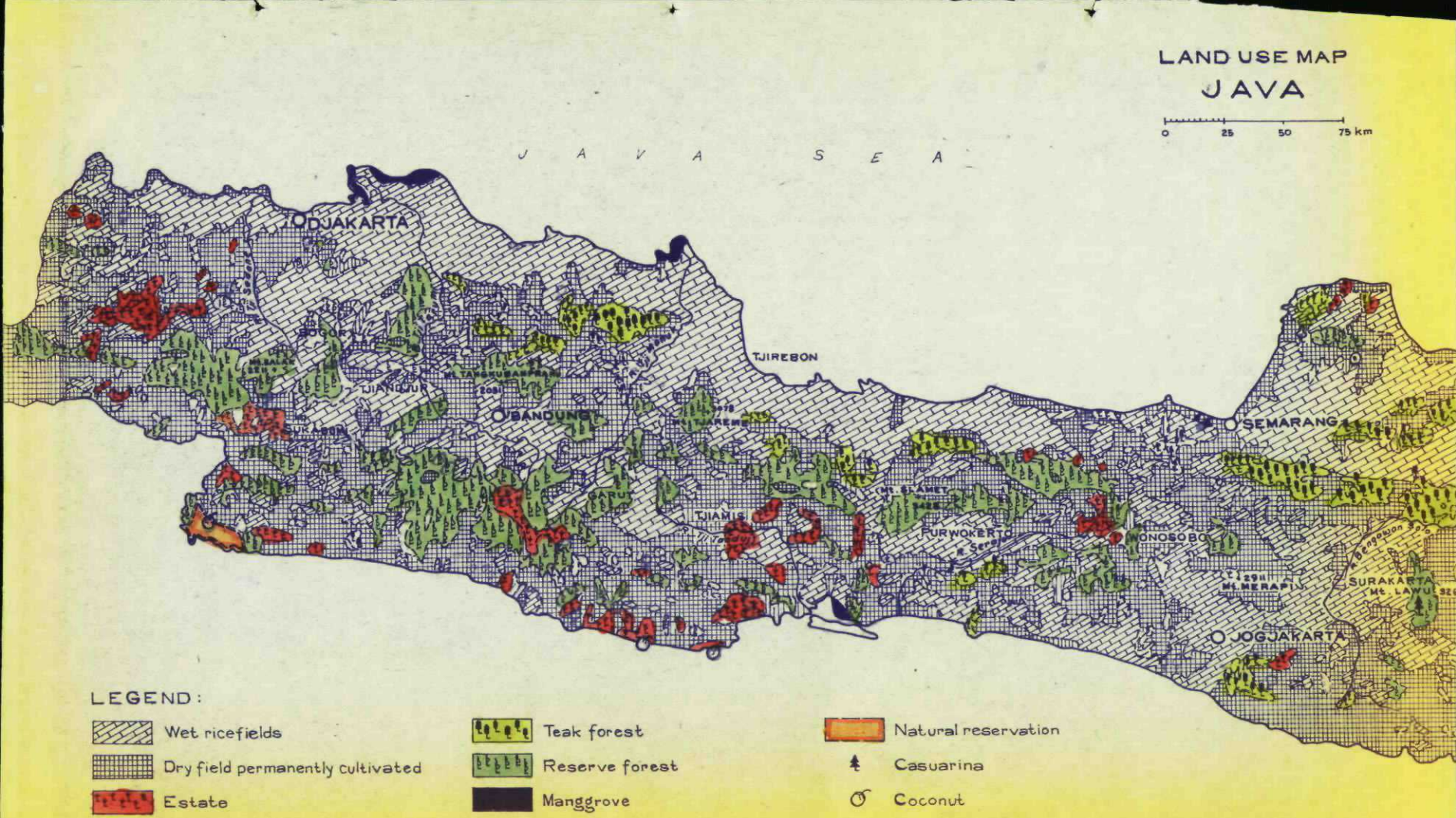
For further detail see tables appendix I.

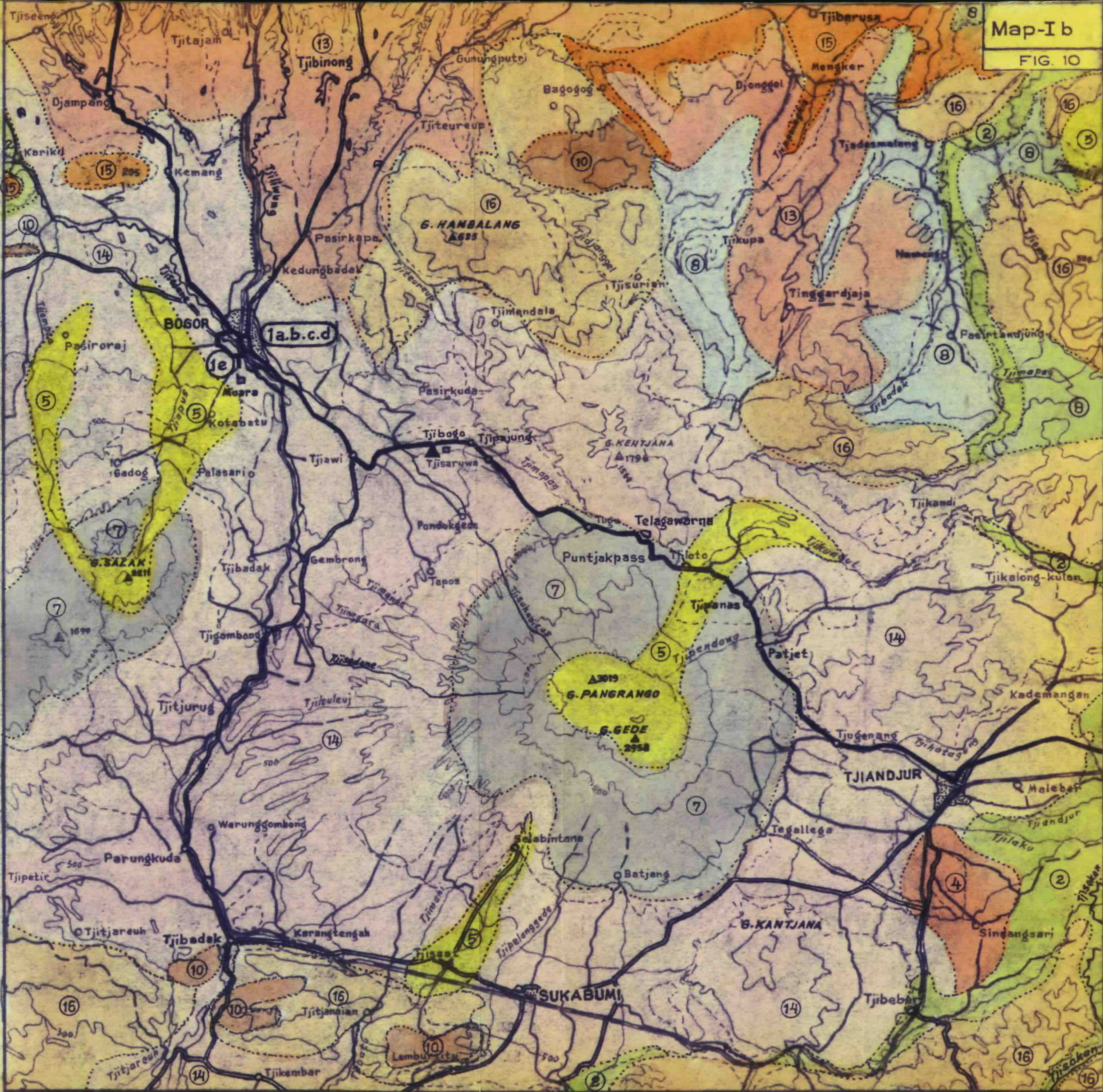
The production data based on administrative boundaries are generally lower than one expects.

Grouping the yields with relationship to soil units still have be done. This will be necessary for correlation purpose with land potential classification and mapping.

LAND USE MAP
JAVA

0 25 50 75 km




Tjiseeng
Tjitajam
Tjibinong
Gunungputri
Bagogog
Djonggol
Mengker
Tjiberusa
Djampang
Karikil
Kemang
Tjiteureup
Tjadasmalang
G. HAMBALANG
Pasirkapa
Kedungbadak
Tjisurian
Tjikupa
Tinggardjaja
Pasirtandjung
BOGOR
1a.b.c.d
1e
Pasiroraj
Moara
Kotabatu
Tjimandala
Pasirkuda
Tjibogo
Tjipajung
Tjisarua
G. KENTJANA
Tjiawi
Gadog
Palasari
Pondokgede
Telagawarna
Puntjakpass
Tjiloto
Tjikandi
Tjikalong-kulon
G. SALAK
Tjibadak
Gembrong
Tapos
Tjipanas
Patjet
Tjigombong
Tjisadane
G. PANGRANGO
G. GEDE
Tjitjurug
Tjileuleuj
Kademangan
Tjugenang
TJIANDJUR
Malebar
Tegallega
Warunggombong
Selabintana
Batjang
Parungkuda
Tjipetir
Tjitjareuh
Tjibadak
Karangtengah
G. KANTJANA
Sindangsari
Tjibeber
SUKABUMI
Tjitjantian
Lemburatu
Tjikembar

Map-I b

FIG. 10

TECHNICAL INFORMATION ON EACH SITE

Site - 1 : Institute at Bogor

(a) Soil Research Institute (SRI)

The Soil Research Institute was established in 1905.

The name was changed several times. The abbreviation B.I. for "Bodemkundig Instituut" is still well known among the old generation.

Prior to 1966 the institute was part of the General Agricultural Res. Station within the Department of Agriculture.

Since 1966 the SRI is an independent institute operating at the same level as the Central Agricultural Research Institute (LP_3) and the Horticultural Research Institute and resorting under the Directorate General of Agriculture.

The main task of the SRI is the investigation of soils for agricultural purposes. This includes soil survey and mapping, research on physical and chemical soil properties, and research on soil fertility (inside and outside the SRI.

To carry out this job, the SRI is subdivided into 3 technical divisions (viz. Pedology, Fertility and Physics), a secretariate and 2 branches in Malang (East Java) and Jogjakarta (Central Java). The routine laboratory resorts under the Fertility Division; Drawing and Reproduction is supervised by the Pedology Division.

a. Laboratories

The SRI is accomodated with the following laboratories : (1) the routine soil laboratory (with a capacity of 10.000 soil samples/year), (2) the laboratory for leaf and water analyses, (3) the soil physics laboratory, (4) the air-photo laboratory.

X-ray, micropedology and drafting equipment are awaiting installment. A printing shop is in the planning stage.

A field soil laboratory, set up in Palembang (South Sumatra) by UNDP, is entrusted to the Agricultural Faculty of Sriwidjaja.

b. Displays

A display is given at the SRI. The following items are exposed :

(1) Maquettes -

Reconnaissance Soil map of Lampung

Reconnaissance Soil map of Java/Madura

(2) Generalized soil map of Indonesia illustrated with monolits of 12 Major Soil Group.

(3) Panels showing the activities of the 3 Divisions viz.

- Soil survey & mapping for Agricultural Development
- Rationalization of landuse in Lampung
- Laboratory activities
- Fertility Studies in the greenhouse and in the field
- The phosphate status of paddy soils on Java.

- Research on soil physics for Soil and Water conservation.
- Aggregate formation in Regosols with the aid of bituminous emulsions (Soil conditioners).

(4) Stereograms of typical landscapes

- Folded structure in Madura
- Palaeogene region in Gunungtua.

(5) Geological map of different scales made available by the Geological Survey of Indonesia.

- Geological maps of Kalimantan, Bali and Tjiandjur at the scales of 1 : 500.000; 1 : 250.000 and 1 : 100.000, respectively.

(6) Publications.

The staff of the SRI consists of 28 seniors (university graduates for the greater part) and 29 juniors (with technical education).

At this moment 4 expert from FAO, the Netherlands and Belgium strengthen the staff of the institute.

In the frame of bilateral and multilateral aids programmes the SRI will be equipped with a modern drafting room, a printing shop and some micropedology instruments.

(b) Bogor Agricultural University (IPB)

The institute for high education was established in 1947 as the "Faculty of Agricultural Sciences", and resorted under the University of Indonesia. In the beginning it compresed 2 main directions : Agriculture and Forestry.

In February 1950 the Faculty became the official: Agricultural Faculty of the University Indonesia.

On September 1st, 1963, the Bogor Agricultural University was established. It consists of 6 Faculties: Agriculture, Veterinary Science, Forestry, Animal Husbandry, Fishery and Agricultural Engineering.

At present, the Bogor Agricultural University has 2300 students and 356 Lecturers (1970). The main building at Baranangsiang houses the Faculty of Agriculture; the other faculties are spread over the vicinity.

Attached to the main building are a student hostel, laboratories, green houses and experimental gardens for annual, perennial and horticultural crops.

There is a close cooperation with other scientific institutions in Bogor.

(c) Botanical Garden

The Botanical Garden, located on the grounds of the Bogor Presidential Palace, is world famous because of its unique collection of tropical flora.

It was founded 155 years ago by Prof. Dr. C.G.L. Reinwardt, a Dutch Botanist. As assistant to the Governor General, he had the primary task to exploit the biological natural resources by introducing and experimenting various economical plants in Indonesia such as Vanilla, oil palm, cinchona, getah percha, sugar cane, corn. With Dr. C.L. Blume (1822) as Director, the first catalogue was made for a total amount of 912 species. Under the direction of J.E. Teysman in 1831-1869, the plant collection greatly increased from about 2000 species to more than 8500 species. This was the start of the Central Botanical Research activities in South East Asia. During Teysman's period about 43 important plants were introduced and successfully planted. One of his results was the introduction of the first oil palm trees (Elaies) about 125 years ago; their off-quires are the high grade oil palms now cultivated in Sumatra and Malaysia. Dr. Scheffer (1869-1880) the following Director,

initiated the Herbarium, Museum, Laboratory for Botany, Chemistry laboratory, Library and the experimental garden, most of which become an independent institution now under the National Biological Institute. Under Prof. Dr. Melchior Treub (1880-1905) the Botanical Garden became the central basic research station on tropical botany. He founded the Treub laboratory in 1884, which later became the Institute for Botanical Research; its building was officially opened in 1914. About some hundreds botanical scientists of internationally repute have worked there.

The extension of the Botanical Garden was done through the establishment of several branches in different parts of Indonesia such as Tjibodas Mountain Garden (West Java, 1862), Sibolangit (North Sumatra, 1914), Purwodadi (East Java, 1941), Setiamuka (Central Sumatra, 1955) and Bali (1959). Due to financial shortage, the Sibolangit, Setiamuka and Bali gardens were transferred to the Forestry Extension Services.

After Treub, the successive Directors of The Bogor Botanical Garden were: Koningsberger (1905-1918), Dochters van Leeuwen (1918-1932), Dammerman (1932-1939), Baas Becking (1939-1940), Van den Honert (1940-1941), Van Slooten (1941-1944), Nakai (Japanese) (1944-1946), Baas Becking (1948-1949) and Van Slooten (date ?). Since 1949 Prof. Ir. Kusnoto Setyodiwirjo took over the directorship until 1959 and his successor Ir. Sadikin Sumintawikarta is the latest director of the Botanical Garden. For in June 1962 the Botanical Garden was

integrated in the National Biological Institute (the NBI) together with other institutes such as the Herbarium Bogoriense, the Institute for Botanical Research, the Bogor Zoological Museum and the Institute for Marine Research. Prof. Dr. Otto Sumarwoto was the first director since then.

The Botanical Garden covers a superficy of about 125 acres with two branches in Tjibodas (West Java) and in Purwodadi-Malang (East Java). The plant collection amounts to 186 Families, 1.542 Genus and 5386 species and consists of 15.068 trees , while the Tjibodas Mountain Garden has 1.539 species.

The multi-function of this garden which bears officially the name of Hortus Botanicus are the following :

a. collection of living plants of economical and/or scientific value.

b. research and experiments on the genetical, morphological, ecological, horticultural properties of the collected plants.

c. practical experiments about the introduction of plants that may have economical potential for the development of agriculture, horticulture, floriculture, estate, forestry and others.

d. providing facilities for research, education and guidance on botany to students and pupils.

e. as a recreation site for public in order to let it understand and love nature.

Inside this beautiful garden one will find an Orchid house (± 1400 species), a scenic pond, a Palm tree collection (352 species), ornamental plants, fern and bamboo collections, and still others.

(d) Research Institute for Estate Crops

The Research Institute for Estate Crops (BPPB) was established in 1956. It is financed and managed by the Foundation of Research and Educational Funds under the Ministry of Estates. By the end of 1968, with the reorganization of the Cabinet, the Indonesian Institute for Rubber Research (INIRO) was fused into the Research Institute for Estate Crops. These two institutes were originally founded in 1935 (Centraal Proefstation Vereniging, CPV) and 1941 (NIRO) respectively. The first one originated from the West Java Experimental Station created in 1914.

At present the institute has a branch in Djember (Djember Experimental Station) and 6 experimental gardens (2 for rubber, 1 for tea, 1 for cinchona, 1 for coffee and 1 for mixed garden - rubber, cocoa, tobacco and rice -)in West and East Java.

The institute has a well equiped laboratory, a fine library and a pilot plant for the processing of rubber.

The institute is divided into 6 divisions viz. Agronomy, Crop Protection, Plant Breeding, Soils and Fertilization, Technology, Economy and Planning.

The programme of the Institute comprises researches and extensions which are directed towards increasing yield of estate crops and improving their quality and presentation. This programme covers the agronomical, technological and economical areas.

Its activities cover South Sumatra, Lampung, Java, Kalimantan and Sulawesi.

Its Staff consist of 17 senior officers in Bogor and 5 in Djember (all university graduates) and 40 assistants.

(e) Muara Experimental Garden

The Muara Experimental Garden is situated some 3 km west of Bogor. This garden is one of the oldest experimental gardens and is managed by the Central Research Institute for Agriculture. It lies at an elevation of 225 m., and recieves with an average annual rainfall of 4215 mm spread over 228 days. Its soils are Reddish Brown Latosols and Regosols developed in the andesitic material of the mountain Salak. Its territory covers some 40 hectares, which can all be irrigated in the wet season and partly (10 hectares) in the dry season.

This important experimental garden has two main functions. Firstly it coordinates all research activities on rice and corn breeding, and rice cultivation soils; it carries out experiments on legumes and herbicides, and it is involved in seed multiplication of rice, corn, sorghum, soybean, peanut and mungbean.

The second task of the Muara Experimental Garden is to provide to seed inspectors and rice production specialists. The introduction of improved varieties through high quality seeds is aimed at.

This Centre bears the name of Kamadjaja Dewi Ratih, as was approved by President Suharto on May 20th, 1968. Several buildings equipped with electricity and running water have been built. These buildings contain rooms for experts and administrative personnel of the seed laboratory, a class room for 30 students, storage rooms and a garage.

There is also an auditorium and an open exhibition space.

Other training course which are still in the planning stage center on rice processing, pest control and field experiments. Laboratory facilities will be provided by foreign technical aid.

(1) Experimental plots

Further details on current activities, the location of the farm, results, etc. will be explained on the spot by staff members of the Central Research Institute for Agriculture.

(2) The Latosol sawah profile

The "Muara" territory has been mapped twice, vix. by H. Jahja (1944) and by F.F.F.R. Koenigs (1949), both at a scale 1 : 2000.

Two major great soil groups are found: Latosols and Regosols. Both are derived of andesitic volcanic material from the mountain Salak.

Latosols make up the greater part of the soils.

Almost the entire area has been irrigated for a long time. By this continuous wet rice culture profile development was influenced as is witnessed by black and grey mottles below the 15 cm thick bleached surface layer. The upper most part of this blackish layer is firm and platy, 5 - 8 cm thick and only slightly permeable to water (the plow pan). Below this pan a 2 - 3 cm thick yellowish colored layer, occurs which is compact and weakly laminated (Fe-layer).

Underneath this layer the soil shows reddish mottling increasing with depth: the consistency is plastic and sticky.

Due to deeper cultivation by tractors the pan and the Fe-layer are locally destroyed and mixed with surface layer material.

The morphological and laboratory figures are shown in table - 7.

Table - 7

Inst. number : -

Location : Experimental Station of Central Research Institute for Agriculture, Muara

Classification : Reddish Brown Latosol (paddy soil) (7th App.: Durandept)

Anthropaquic — Tropudult (Dudal) Zie foto's

Geomorphology : Undulating Volcanic fan of Mt Salak

Parent material : Intermediate Volcanic tuff

Elevation : 260 m above sea level

Climate : Type Af, Annual rainfal 4154 mm. Mean dry months: 0,3; Mean wet months: 11,4

Landuse : Irrigated rice field

Description :

0 - 16 cm	Ap	Dark brown (7,5 YR 4/4), clay, moderate fine sub-angular blocky to crumb, friable, few faint manganese and iron mottles, common fine roots, clear smooth boundary,
16- 35 cm	B_{1fe}	Dark reddish brown (5 YR 3/2), clay, moderate coarse angular blocky to massive, very firm (very hard when dry), many manganese and iron mottles, few fine roots. In the 2 cm below mainly consist of reddish yellow (5 YR 6/8) iron layer, clear smooth boundary.
35 - 40 cm	B_{mn}	Reddish brown (5 YR 4/3-4/4) clay, moderate medium angular blocky, firm, many manganese and common iron mottles and concretions decreasing with depth clear smooth boundary.
40 -135 cm	(B_2)	Reddish brown (5 YR 3/4-4/4), clay, weak medium sub-angular blocky to crumb, friable, many manganese mot-les and concretions decreasing with depth, gradual smooth boundary.
135 + cm	BC	Reddish brown (5 YR 4/4), clay, weak fine crumb, firable, many manganese mottles, and many weathered material (tuffs).

Note : In some places iron and manganese layer were disappeared by deep plowing or digging.

Analytical data from nearby profile

Inst. No.	Depth (cm)	Texture			100 gr of fine earth < 2 mm Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
134741	0 - 15	7,0	38,4	54,6	1,77	0,25	7,4	96	22	4,8	5,7
742	15 - 40	5,1	18,9	76,0	0,58	0,12	5,0	95	56	6,3	5,1
743	40 - 80	4,2	17,9	77,9	0,40	nd	nd	97	59	6,8	5,3
744	80 -160	4,0	17,6	78,4	0,45	nd	nd	114	64	6,7	5,2
745	160 +	8,3	24,5	67,2	0,29	nd	nd	117	73	6,4	5,1

Note : nd = not determined

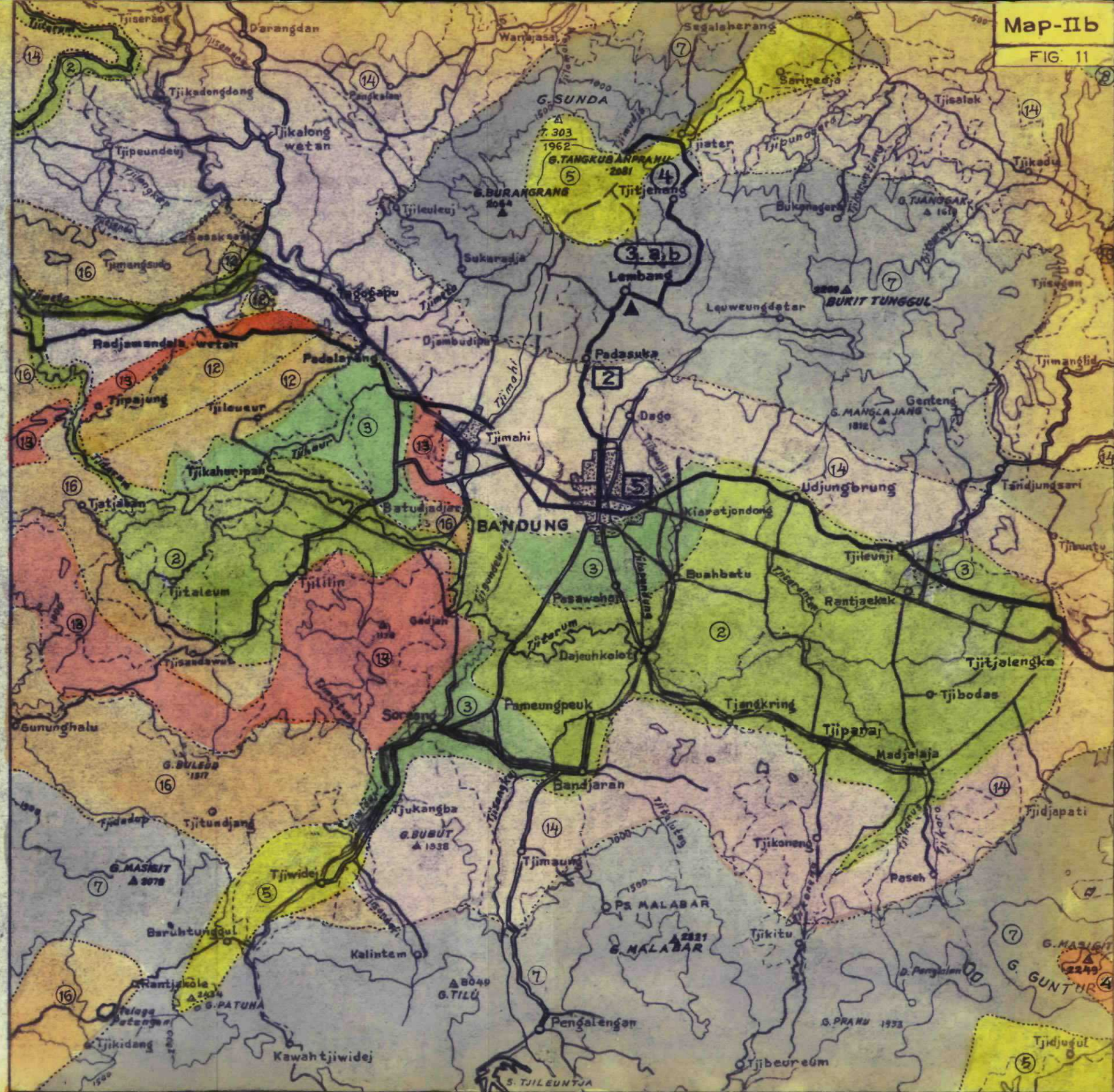
Mineralogical composition of the sand fraction

	Institute number				
	134741	134742	134743	134744	134745
Fraction	IV	IV	IV	IV	IV
Opaque	29	21	15	25	18
Quartz (turbid)	3	3	3	2	1
Quartz (transparent)	6	12	12	8	6
Iron concretion	17	10	11	18	29
Miscellaneous	8	8	11	13	10
Rock fragments	4	5	5	7	4
Volcanic glass	2	1	8	3	1
Oligoclase	4	2	1	2	tr
Plagioclase (int.)	15	31	33	24	30
Plagioclase (bas.)	3	-	-	1	1
Sanidine	1	-	-	-	1
Biotite	tr	-	-	-	-
Hornblende (green)	tr	-	-	tr	tr
Augite	3	tr	-	tr	tr
Hypersthene	5	7	1	tr	tr

Note : tr = trace

Map-IIb

FIG. 11



Site - 2: Laboratory of the P.N. Aerial Survey (PENAS), Lembang

The PENAS laboratory is situated in Lembang, a small resort place, about 25 km north of Bandung at an altitude of 1000 metres. This Photogrammetric Unit was located there because of the good climatic condition of this region (quiet and cool).

The owner of the laboratory is a Governmental Enterprise founded in May, 1961. Originally it is issued from the Aerial Photos Squadron of the Indonesian Air Force in 1950. Its activity was to fulfil the needs of aerial photographs for civil purposes. In order to ensure better public services, the top leaders of the Air Force at that time (1960) provided the Institute with laboratory facilities and personnel. With the growing demands for air photos and the urgent need to separate this Institution from military activities, it became a Governmental Enterprise bearing the name of PN. Aerial Survey (PENAS).

The flight missions were formerly done with two Mitchell B-25 bombers and two Dakota C-47 Carriers, equipped with Fairchild T-11 and Wild RC-8 Cameras. In the middle of 1964, the construction of the PENAS main building was completed at the Kemayoran Air Port. It is equipped with working facilities and a modern photo laboratory.

In the framework of the First Five Years Development Plan (1969-1972), it was planned to increase the output capacity of PENAS. In the first quarter of 1971, two Cessna 402-B, each with twin turbo engines were received, numerous Aerial cameras, photogrammetric equipment, terrestrial measurement devices,

Airborne Geophysical instruments and last but not least, Photogrammetric Unit Laboratory at Lembang, Bandung.

This PENAS laboratory has a working superfices of about 10.200 square metres and consists of a photogrammetry building (994 m^2) a Guest house (305 m^2), and six house Units for the staff. Domestic and foreign trained experts and operators serve this photogrammetry department installed in April 1971.

The laboratory is equiped with a Zeiss Planimat and a Zeiss D.P. 1 Double Projector. There are also Printing counter, Ecomat, profilometer, orthoprojector tilt computer, storage unit. Communication with Central office at Djakarta is foreseen by SSB radiophone.

Site - 3a : Soil and Landuse in Margahaju Lembang

The volcano "Tangkuban Parahu" is situated North of Bandung. This volcano has recently deposited some basic ash on its southern slope.

The Lembang plain is a depression formed by the Lembang fault which filled with these ashes lateron.

The basic ash is still visible in the subsoil and is hardly weathered. The ash soils are very permeable to water, and there are still many organic inclusions originating from the vegetation. Under the humid climatic conditions the weathering process resulted in black coloured soils known as Andosols. Profile descriptions and analytical data from a site in Margahaju are presented in Table 2.

This soil is rich in phosporus, potassium and organic matter, and is therefore very suitable for the cultivation of vegetables (potatoes, cabbage, carrots, tomatoes, beans), fruits (apples, bananas , citrus, avocado, pine-apple), flowers, and food crops (rice, maize and sweet potatoes).

To improve the quality and yield of these crops the experimental and collection gardens of the Horticultural Station, are situated in this area. Range land for cattle and Pinus forest are found in its surroundings.

Table - 8

Inst. number	: 155575/579
Location	: Tjikole forestry station and experiment gardens
Classification	: Andosol
	(7th app.: Argiudollic Eutrandept)
Geomorphology	: Undulating to rolling (volcanic ridge)
Parent material	: Intermediary volcanic ash
Elevation	: ± 1200 m above sea level
Climate	: Type Af, annual rainfall 2200 mm
	Mean dry months: 2,6; Mean wet months: 8,0
Landuse	: Forestry and experiment garden (Pinus Mercusii)

Description :

0 - 21 cm A_1	Dark grey brown (10 YR 3/2), loam, weak very fine crumb, very friable, clear smooth boundary,
21 - 64 cm A_2	Brown to dark brown (10 YR 4/3), silty loam, weak very fine crumb to subangular blocky, very friable, clear smooth boundary,
64 - 83 cm C	Dark brown (10 YR 4/3-3/3), clay loam, moderate fine subangular blocky, friable to firm, abrupt smooth boundary,
83 - 165 cm IIA_1	Black (10 YR 2/1), silty loam, weak very fine crumb, friable, clear smooth boundary,
165 + cm (IIB_{2+})	Dark brown (10 YR 3/3), clay loam, moderate medium subangular blocky, firm, clay illuviation.

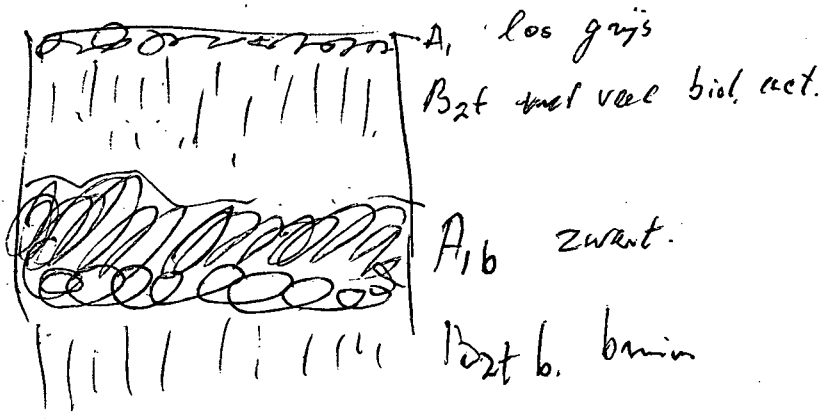


Table - 8 continued

Analytical data

Inst. No.	Depth (cm)	Texture			100 gr of fine earth < 2 mm Organic matter Extractable in HCl					pH	
		Sand %	Silt %	Cla %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
155575	0 - 21	16	74	10	10,8	0,89	12	209	24	5,2	4,7
576	21 - 64	20	68	12	6,2	0,52	12	137	7	5,7	5,3
577	64 - 83	33	59	8	nd	nd	nd	152	14	5,6	5,3
578	83 -165	7	83	10	nd	nd	nd	101	8	5,1	4,7
579	165 +	7	79	13	nd	nd	nd	117	15	5,6	5,3

Note : nd = not determined

Mineralogical composition of the sand fraction

	Institute number				
	155575	155576	155577	155578	155579
Fraction	IV	IV	IV	IV	IV
Quartz (turbid)	2	..	-	-	-
Iron concretion	2	8	-	1	17
Zeolite	3	..	-	-	-
Miscellaneous	19	27	20	53	40
Rock fragments	22	13	14	7	5
Volcanic glass	6	2	1	4	1
Plagioclase (int.)	13	32	47	11	16
Plagioclase (bas.)	1	-	-	-	-
Sanidine	-	tr	-	tr	-
Hornblende (green)	9	10	14	19	15
Hornblende (brown)	-	1	tr	-	tr
Augite	21	5	2	4	4
Hypersthene	2	1	2	1	2
Olivine	tr	1	-	-	-

Note : tr = trace.

The unweathered unconsolidated subsoil (called "terrasso") is used for bricks. Many quarries are encountered along the road from Bandung to Lembang.

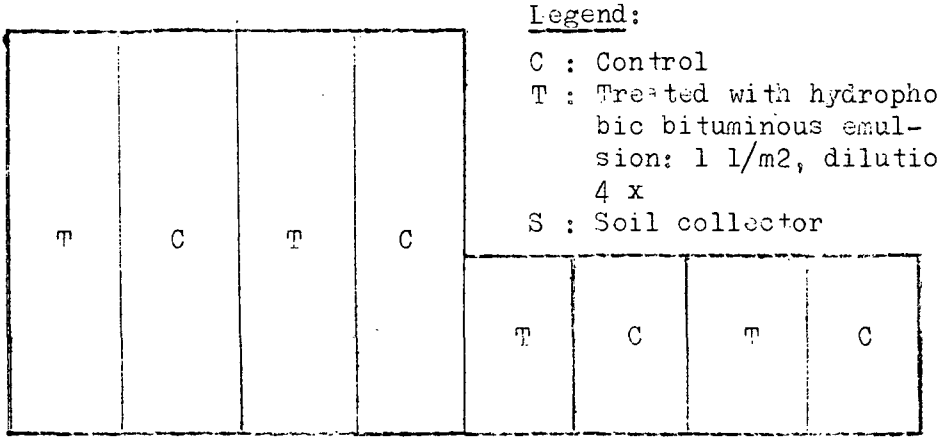
Lembang is famous as a resort place. The beautiful scenery with the Tangkuban Parahu and the hot springs of Maribaja make this place very attractive.

Site-3b. Stabilization experiments with bitumen emulsions.

Andosol is well known for its poor structure and for being very sensitive to wind and water erosions.

The preliminary field experiments were conducted to find out the effect of soil conditioners on the improvement of the physical properties of Andosol. It has unique properties due to high content of amorphorus alumino silicates.

Lay out of the trial



Legend:

C : Control
T : Treated with hydrophobic bituminous emulsion: 1 l/m2, dilution 4 x
S : Soil collector

Site - 4. The craters "Upas" and "Ratu" of Tangkuban Parahu

zie foto's

The name "Tangkuban Parahu" means capsized boat because the top of the volcano resembles a boat, turned up side down. A visit to its craters is certainly one of the easiest volcano expeditions possible on Java, since a good asphalt road has been laid right up to the crater rim (Fig - 16).

veel 2-wavel

The Tangkuban Parahu is a strato volcano with its longest axis in E-W direction (See map). The volcano has two craters. According to Van Bemmelen (1949) the present craters are formed at the latest eruption of the Tangkuban Parahu, which took place during the formation of the mo recent phase of the volcanic Sunda Complex, North of Bandung.

Seen from the north, the left hand crater is the "Kawah Ratu" (Queen crater). Its rim and bottom have dimensions of 650 x 500 meters (1976 m above sea level) and 330 x 300 meters (1722 m a.b.l.). This is the second crater (Kawah Ratu B); the first one (Kawah Ratu A) forms presently the western rim bordering the Kawah Upas.

The right hand one, Kawah Upas, has a crater rim and bottom of 800 x 560 meters (1900-1830 m a.s.l.) and 500 x 300 meters (1785 m a.s.l.) respectively.

This is the third crater (Kawah Upas C) after two older craters (Kawah Upas B and A) had been destroyed by eruptions long before. These eruptions are now witnessed by the crater rims, south and south-west of the tip. This oldest volcano was named Panggujangan Badak; it can still be traced in the upper western part of the mountain which is now covered by dense tropical forest. In addition there are still 3 other active (small) craters, viz. Kawah Domas-Badak, Djurig and Djarian which are located on the eastern and north eastern parts of the volcano. Two more recent craters, Kawah Ecoma and Kawah Badak, resulted from eruptions in 1896 and 1929, which took place near the center of Kawah Ratu and at the right side of the Kawah Upas resp.

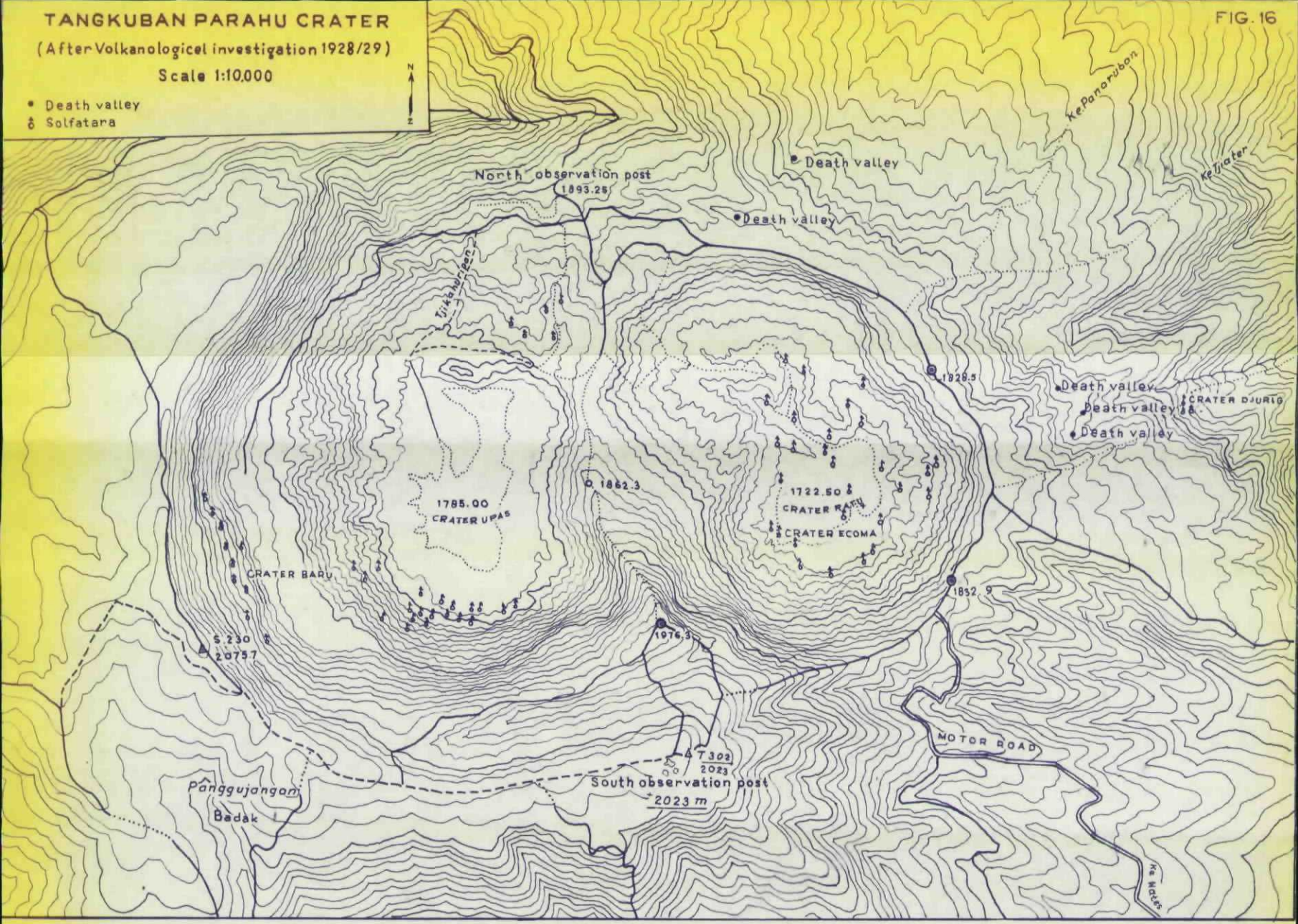
The eruptions were generally moderate. Recorded eruptions and periods of stronger activity occurred in : 1829, 1846, 1896, 1910, 1926, and 1950. In July, 1952, a minor eruption took place in Kawah Ratu and in June, 1957, a new blow-out was recorded in the Kawah Baru crater. At present no pronounced volcanic activity occurs, but the usual solfataric phenomena can probably be seen.

Inside the Kawah Upas and Kawah Ratu and on the borthern and eastern slopes of the Kawah Ratu, there are many places where suffocating gasses (H_2S, CO_2 and CO) escape. These place are very dangerous and

are known as "Death valleys". On the enclosed map such places are indicated by a cross (+) especially in the Kawah Upas and Ratu, or with the word "Stikvallei" ("Choke Valley") in the other parts.

The rocks on the top of the volcano consist of pyroxene andesites with or without olivine and were called basalt by Verbeek (1896), Stehn (1929) and Van Bemmelen (1949).

FIG. 16


TANGKUBAN PARAHU CRATER
(After Volkanologicel investigation 1928/29)
Scale 1:10,000
Death valley
Solfatara
N
Z
North observation post
1893.25
Death valley
Death valley
Ke Panaruban
Ke Tjiater
Tjikahoelan
1829.5
Death valley
Death valley
Death valley
CRATER DJURIG
1862.3
1785.00
CRATER UPAS
1722.50
CRATER RATU
CRATER ECOMA
CRATER BARU
1852.9
S 230
2075?
1976.3
MOTOR ROAD
7302
2023
South observation post
2023 m
Panggujangan
Badak
Ke Noord

Site - 5 : <u>The Museum of the Geological Survey, Bandung</u>

The Geological Museum is placed under the Division of Documentation, Publication and Information of the Geological Survey of Indonesia, Ministry of Mines.

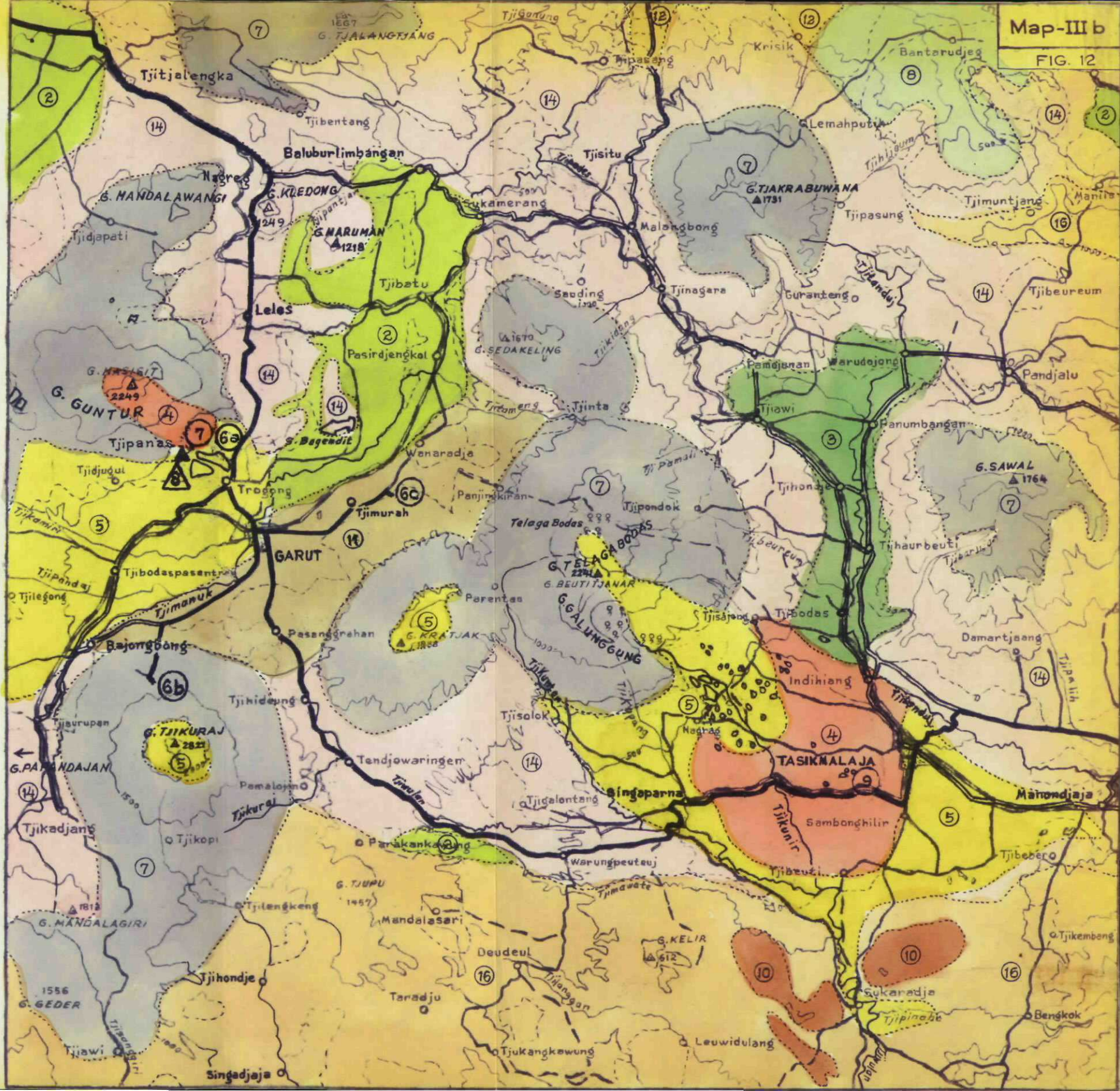
This museum was inaugurated in 1929, concurently with the convention of The Fourth Pacific Science Congress which was held at Batavia (now Djakarta) in 1929. This is the only museum of its sort in Indonesia, which displays various rocks and fossils, models of volcanoes, minerals etc.

Detailed information will be presented as leaflets when visiting the museum.

Zie foto's van de Pithecantropus (schedel & een compleet) die in 1969 in ee midden kwartaire zandsteen bloothwan bij erosie e door de bevolking werd ontdekt.

Map-III b

FIG. 12



Site-6a: European Nitrogen Service Programme (E.N.S.P.)
Garut, West Java

E.N.S.P., sponsored by Nitrex A.G. Zurich Switzerland, has begun its activities in March 1971 in Garut. The objective of E.N.S.P. is to support "Agrotechnical Assistance" to the Department of Agriculture, i.e. the Directorate General of Agriculture and the Extension Service, for agricultural developments.

During the dry season of 1971, demonstration plots and trials have been made Their objective was to estimate the response of rice to various doses of nitrogen. The results indicated that rice gave good response to 90 kg N/ha. (See appendix II).

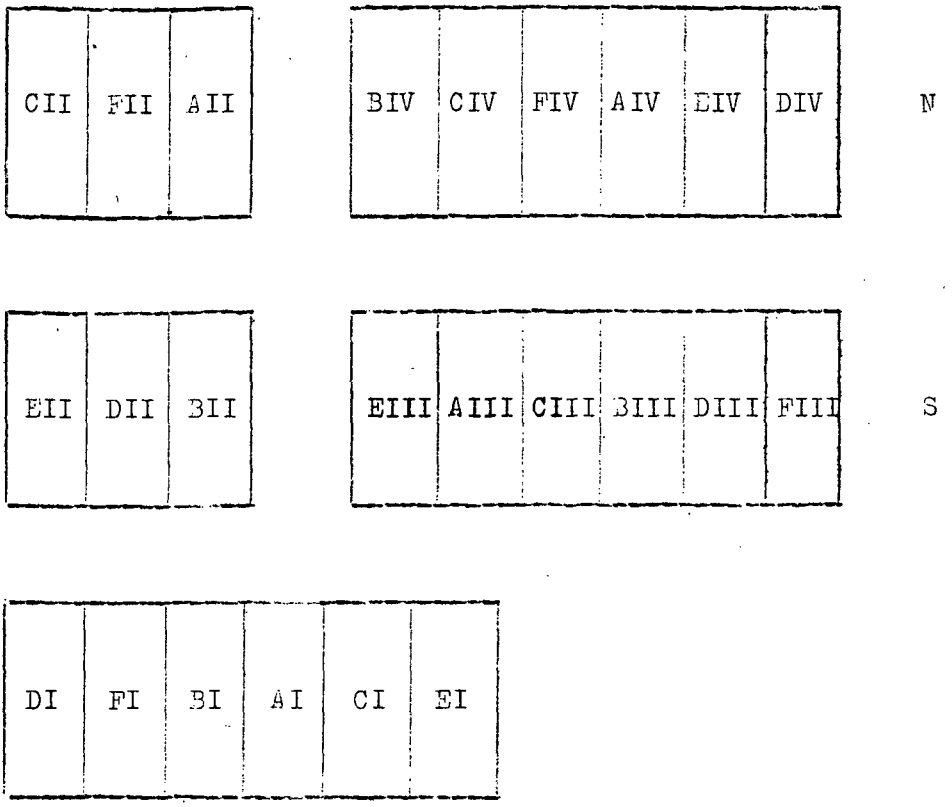
Based on these results, multilocative trials and replicated trials were conducted in 1971/1972. One of the trials is at Tarogong.

Zie foto's met volgnaam op dekstgrma

Fertilizer trial at Tarogong

1. Purpose : to determine the most economic nitrogen dose based on nitrogen response curve.
2. Design : Randomized Black Design, 4 replication
3. Treatments : A = 0 kg N/ha D = 135 kg N/ha
   B = 45 kg N/ha E = 180 kg N/ha
   C = 90 kg N/ha F = 225 kg N/ha
   All are supplied with 40 kg P_2O_5/ha and 40 kg K_2O/ha
4. Plot size : 30 sq.m.

5. Lay out :



Symbols of treatment.

A	=	0	D	135 kg/Ha	N
B	45 kg/Ha	N	E	180 kg/Ha	N
C	90 kg/Ha	N	F	225 kg/Ha	N

I - IV = replication

6. Soil : Regosol from basic volcanic material

Table - 9

Institute number	: 161017/020
Location	: The ENSP experimental plot, Pasawahan village, Banjuresmi, Garut
Classification	: Dark Gray Regosol (7th app.: Fragiaquept)
Geomorphology	: Alluvial fan
Parent material	:Basic volcanic material
Elevation	: 714 m above sea level
Climate	: Type Awa; Annual rainfall 1895 mm. Mean dry months: 3,3; Mean wet months: 9,0
Landuse	: Irrigated terrace rice field

Description:

0 - 30 cm	I	Very dark gray to very dark grayish brown (10YR3/2-3/1), silty clay loam, slightly sticky and slightly plastic.
30 - 40 cm	II	Very dark grayish brown (10YR3/2), gravelly clay loam, slightly sticky and slightly plastic.
40 - 60 cm	III	Dark gray (10YR4/1), gravelly clay loam, slightly sticky and slightly plastic.
60 - 80 cm	IV	Black (10YR2/1), silty loam, slightly sticky and slightly plastic.

Note : Analytical data are not yet available.

A. Demonstration plots (Multilocation trials)

1. Paddy

Variety	Plot No	Wet season			Dry season		
		No	P_2O_5	K_2O	N	P_2O_5	K_2O
H.Y.V.	1	0	0	0	0	0	0
	2	45	0	0	90	0	0
	3	90	0	0	90	45	0
	4	90	45	0	135	45	0
	5	135	45	0	135	45	36
	6	135	45	36	180	45	36

Variety	Plot No	Wet season			Dry season		
		No	P_2O_5	K_2O	N	P_2O_5	K_2O
Local	1	0	0	0	0	0	0
	2	45	0	0	45	0	0
	3	45	45	0	67,5	45	0
	4	67,5	45	0	90	45	0
	5	90	45	0	90	45	36
	6	90	45	36	136	45	36

B. Trials (replicated trial)

1. Paddy

Design: Factorial Randomized Blocks

Replication three

Factor 1. Nitrogen levels

N_o = 0 kg.N/Ha.
N_1 = 45 kg.N/Ha.
N_2 = 90 kg.N/Ha.
N_3 = 135 kg.N/Ha.
N_4 = 180 kg.N/Ha.
N_5 = 225 kg.N/Ha.

Factor 2. Varieties

V_1 = Pelita I/2
V_2 = C.4 - 63

Treatment combinations:

1. $A_1 = N_oV_1$
2. $A_2 = N_oV_2$
3. $B_1 = N_1V_1$
4. $B_2 = N_1V_2$
5. $C_1 = N_2V_1$
6. $C_2 = N_2V_2$
7. $D_1 = N_3V_1$
8. $D_2 = N_3V_2$
9. $E_1 = N_4V_1$
10. $E_2 = N_4V_2$
11. $F_1 = N_5V_1$
12. $F_2 = N_2V_2$

2. Corn (Tjikadjang)

a. R.B.D. with five fertilizer treatments and four replications

b. Plot size = 6 x 5 sq.m.

c. Distance of planting = 100 x 20 cms.

d. Depth of planting = 3 - 4 cms.

e. Seeds per hill = 2

f. Variety = Menado Kuning

g. Fertilizer treatments (kg/ha):

Treatments	N	P_2O_5	K_2O
A	0	0	0
B	45	45	30
C	90	60	30
D	135	60	30
E	180	60	30

3. Soybean (Wanaradja)

a. R.B.D. four treatments with five replications

b. Plot size = 6 x 5 sq.m.

c. Plant distance = 25 x 25 cms.

d. Depth of planting = 2 - 3 cms.

e. Seeds per hill = 3

f. Variety = Davros

g. Fertilizer treatments (kg/ha) :

Treatments	N	P_2O_5	K_2O	$CaCO_3$
A	0	0	0	0
B	0	45	0	0
C	22,5	45	0	0
D	22,5	45	48	0
E	0	0	0	500
F	0	45	0	500
G	22,5	45	0	500
H	22,5	45	48	500

4. Cassave (Limbangan)

a. R.B.D. - 6 treatments with 4 replications

b. Plot size = 5 x 5 sq.m.

c. Distance of planting = 100 x 60 cms.

d. Variety = Gading

e. Fertilizer treatments (kg/ha) :

Treatments	N	P_2O_5	K_2O
A	0	0	0
B	30	30	30
C	60	60	60
D	120	60	60
E	60	60	120
F	120	60	120

Site - 6b : Waspada Experimental Basin

The Tjimanuk River, which is the third largest in West Java, has a drainage area of 3560 square kilometers. This area has considerable potentiality for agricultural and industrial development. However from the hydrologic standpoint there are many problems caused by improper land use; particularly in the cultivated hilly areas and the bare spots of the forested areas. These problems are as follows:

a. The intensity of erosion is high and much of the fertile top soil is lost.
b. The river contains much sediment (sand & mud) and irrigation is difficult in the downstream areas.
c. During high intensity rainfalls, the run-off is very pronounced and very harmful floods occur.

Because of these problems the Waspada Experimental Basin was set up to carry out research on hydrology and to draw conclusions with respect to landusage both in the cultivated and in the forested areas. It is expected that the result of this research will help defining the characteristics of some of the causes and the effects of erosion and the influence of land use, vegetation, forest areas, etc on the basin area. The information obtained would then be used as a practical reference for improving the conditions of the Tjimanuk River Basin.

1. HISTORY OF THE WASPADA PROJECT.

Because of the importance of the Waspada research programme, it has been organized as a joint project between the Institute of Hydraulic Engineering (L.P.M.A.), the Bureau of Land Use Service and the Institute of Forestry Research. Cooperation was also required because it became apparent from

the study of literature and from field conditions, that hydrology alone was not sufficient to define all the characteristics needed. In addition other departments would have to look for data about land use, vegetation etc., so that a comprehensive investigation could be carried out.

A survey was made in early 1963 to locate preliminary sites for the measurement of sediment and run-off and for climatological stations.

The investigations commenced officially in October 1963; in fact the initial phase was devated to the on-the-job training of official's in the various field activities involved.

2. OBJECTIVES OF THE PROJECT

The objective of Waspada Experimental Basin project are as follows:

a. To find out the relative intensity of erosion in agricultural and forested areas.
b. To study the run-off by various investigation procedures and techniques.
c. To find out in the area the specifice hydrological condition prevailing in order to draw useful conclusions for the use of soils, forest, etc. These conclussion would be extended to the entire Tjimanuk River Basin which has the same general conditions as the Waspada Experimental Basin.
d. To develop and improve new methods relating to the study of water resources.

3. SUMMARY OF PROJECT

3.1. Country

Indonesia

3.2. Organization

Institute of Hydraulic Engineering Department of Public Works and Power.

3.3. Name of Catchment area

Waspada Experimental Basin

3.4. Location (about 80 kilometers southeast of Bandung)

Longitude $1^{o}1'24''$

Latitude $1^{o}7'50''$

3.5. Area (Fig 17)

9.74 Ha, consisting of: 5 Ha of forest and 4.74 Ha of agricultural land.

3.6. Physiography

a. Geology = Volcanic tuff

b. Topography

Elevation 1300-1440 m a.s.l. Medium to steep slopes on the middle part of the Tjikurai mountain.

c. Soils

Latosol

d. Vegetation

Secondary forest and agricultural land.

4. EQUIPMENT

4.a. Each catchment station has a measuring weir with an automatic water level recorder and a silt settling basin.

4.b. Climatological station

- Ordinary raingauges at al. 0.50, 1.20 and 2.40 m
- Ground thermometers (depths 0.5 and 1.00 m)
- Thermometer (wet and dry) thermograph
- Automatic raingauge

- Wind direction indicator
- Sun shine recorder
- Evaporation pan

5. DATA COLLECTED

a. Hydrology

b. Meteorology

c. Land use

6. ANALYSIS OF DATA

The works aims chiefly at determining relationships between the degree of erosion and the Bund of crop grown and then to compare it with the conditions prevailing in the forested area.

Figures 18 and 19 show the result of analysis of the investigation. No conclusion about the degree of erosion and run-off hazards can be defined, because there is no clear calibration, of each of the trial plantings.

Figure 20 shows the monthly rainfall and computed (observed) average. Figures 21 and 22 shows the monthly temperature and the monthly relative humidity respectively.

7. FUTURE INVESTIGATION

The next investigation will be about the calibration of each type of planting that will be grown, the techniques of cultivation and the degree of shelter given by the coverage of the ground.

By comparing records when the ground is bare with those when the plants provide shelter one should be able to obtain some correlation between the intensity of rainfall and depth of erosion when various plants are used.

Table - 10

Inst. number : 159159/163

Location : Waspada, Garut, West Java

Classification : Humic Latosol (7th app.: Audic Tropohumult) accord zie 1980

Geomorphology : Colluvial slope of Mt. Tjikuraj

Parent material : Andesitic Volcanic materials

Elevation : 1400 m above sea level

Climate : Type Af, annual rainfall 2473 mm. Mean dry months: 2.8; Mean wet months: 8.1

Landuse : Arable land (Potatoes)

Description :

0 - 13 cm $A_{1.1}$ Black (10 YR 2/1), clay loam, weak medium crumb, very friable, diffuse smooth boundary,

13 - 32 cm $A_{1.2}$ Black (7.5 YR 2/0), clay loam, weak medium crumb to subangular blocky, very friable, abrupt smooth boundary,

32 - 55 cm B_1 Dark brown (7.5 YR 3/2), sandy clay, moderate medium to coarse subangular blocky, friable, gradual smooth boundary,

55 -120 cm II B_2 Brown to dark brown (7.5 YR 4/4) heavy clay, strong medium to coarse angular blocky, firm, diffuse smooth boundary,

120+ cm II B_3 Dark brown to brown (7.5 YR 4/4 - 5/4), silty clay, moderate medium angular blocky, firm.

Table - 10 Continued

Analytical data

Inst. No.	Depth (cm)	Texture			100 gr of fine earth <2 mm Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
159159	0 - 13	42.4	29.4	28.2	4.29	0.39	11	50	66	6.0	4.9
160	13 - 32	38.2	33.4	28.4	5.46	0.40	14	63	62	6.0	4.9
161	32 - 55	47.8	18.2	34.0	1.10	0.16	7	8	156	6.7	5.2
162	55 -120	5.5	22.5	72.0	1.07	0.08	13	9	87	6.8	5.1
163	120+	8.3	43.6	48.1	1.24	0.09	14	15	6	8.6	5.3

Inst. No.	Total cation (S)m.e	Absorption capacity CEC(T) %	Base saturation (B) %		SiO_2 / Al_2O_3	SiO_2 / R_2O_3
159159	14.7	36.0	41	gem 150%	1.41	1.24
160	15.3	42.0	36		1.37	1.23
161	18.4	33.8	54		1.81	1.51
162	15.1	34.4	44		1.58	1.33
163	14.4	38.4	38		1.32	1.09

dus ultic

Mineralogical composition of the sand fraction

	Institute number				
	159159	159160	159161	159162	159163
Fraction	IV	IV	IV	IV	IV
Opaque	-	-	-	6	6
Quartz (turbid)	-	-	-	1	1
Iron concretion	6	7	8	43	31
Miscellanneous	1	3	3	31	42
Rock fragments	50	41	42	3	1
Volcanic glass	1	-	-	-	-
Plagioclase int.	-	4	5	-	1
Plagioclase bas.	27	17	17	3	-
Hornblende (green)	tr	3	1	2	3
Augite	8	14	13	2	4
Hypersthene	1	3	5	9	7
Olivine	6	8	6	-	4

Note : tr = trace

Table - 11

Inst. number	: 159165/170
Location	: Waspada, Garut, West Java
Classification	: Brown Latosol / Burried Andosol (7^{th} app.: Tropudult)
Geomorphology	: Colluvial slope of Mt. Tjikuraj
Parent material	: Andesitic Volcanic materials
Elevation	: 1300 m above sea level
Climate	: Type Af, annual rainfall 2473 mm; Mean dry months: 2.8; Mean wet months: 8.1
Landuse	: Forestry

Zie foto's

accoord

Description:

0 - 25 cm I A_1	Very dark brown (10 YR 2/2), clay loam, moderate fine subangular blocky to crumb, very friable, abrupt smooth boundary
25 - 36 cm I $B_{2.1,t}$	Dark brown (7.5 YR 3/2), clay, strong coarse angular blocky, firm to friable, gradual smooth boundary,
35 - 75 cm I $B_{3.2,t}$	Dark brown (7.5 YR 3/2), clay, strong coarse to medium angular blocky, friable to firm, gradual smooth boundary
75 - 95 cm I B_3	Dark brown (7.5 YR 3/2), silty loam, strong subangular blocky, firm, abrupt smooth boundary
95 -150 cm II$A_{1.1/A.1.2}$	Black (10 YR 2/1), silt loam, brittle structure, firm , gradual smooth boundary,
150 + cm IIB	Dark brown (10 YR 3/3), silty clay, moderate, medium, angular blocky, firm.

Fossiel profiel

Zeer fijne bovengrond, vulk. as
Ap of A, niet zwart.
B_2t uitgesproken, norm. Bulk density
Daaronder B_3: eigenlijk C: lage Bulk density (± 0.8). Zie microscoop: allophaanrijk! foto 3)

Table - 11 Continued

Analytical data

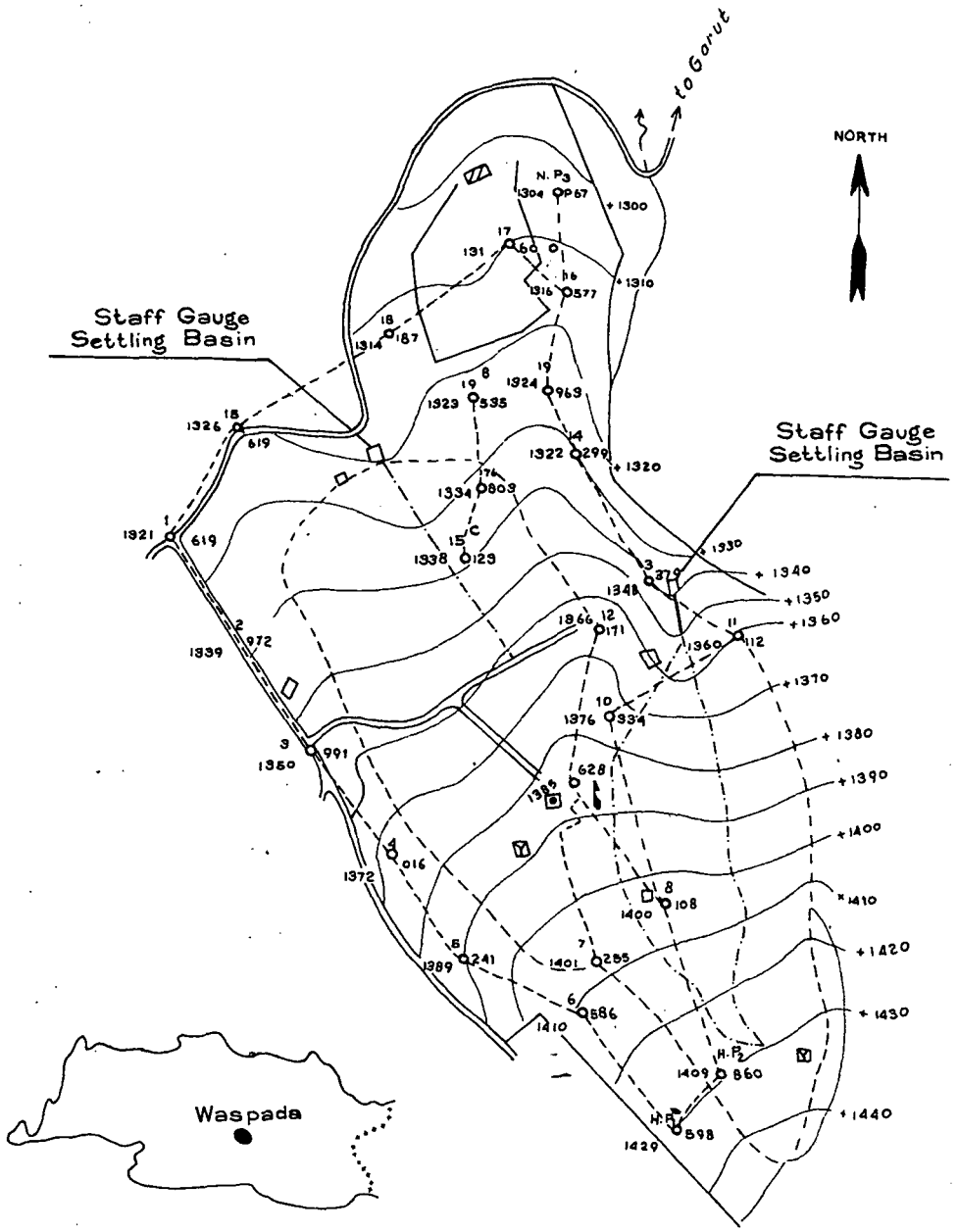
Inst. No.	Depth (cm)	Texture			100 gr of fine earth < 2 mm Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
159165	0 - 25	36.6	28.4	35.0	2.60	0.27	10	26	96	6.4	4.9
166	25 - 35	19.6	22.5	57.9	2.16	0.16	14	21	137	6.4	5.0
167	35 - 75	9.0	32.9	58.1	1.72	0.11	16	42	146	6.7	5.8
168	75 - 95	13.6	73.5	13.9	3.05	0.12	15	21	29	6.4	5.5
169	95 -150	14.9	72.1	13.0	4.24	0.24	18	24	17	6.3	5.4
170	150+	12.2	42.3	45.5	2.38	0.13	17	34	190	6.4	5.8

Inst. No.	Total cation (S) m.e.	Adsorption capacity CEC(T) %	Base saturation (B) %	SiO_2 / Al_2O_3	SiO_2 / R_2O_3
159165	16.9	39.2	43	2.74	2.27
166	19.0	41.4	46	0.94	0.85
167	17.1	41.9	41	1.56	1.33
168	9.4	56.5	16	1.20	1.09
169	9.9	75.5	13	1.20	1.11
170	19.4	46.5	42	1.04	0.93

Mineralogical composition of the sand fraction

	Institute number					
	159165	159166	159167	159168	159169	159170
Fraction	IV	IV	IV	IV	IV	IV
Opaque	3	10	1	2	4	7
Iron concretion	18	12	25	42	13	50
SiO_2 (organic)	1	-	-	-	-	-
Miscellaneous	2	14	60	8	8	26
Rock fragments	31	15	4	11	20	3
Volcanic glass	1	-	-	-	-	-
Plagioclase int.	-	3	2	6	1	1
Plagioclase bas.	25	11	-	6	2	2
Hornblende (green)	1	8	3	1	5	5
Augite	5	18	3	12	12	12
Hypersthene	2	8	1	7	13	8
Olivine	11	3	3	6	22	1
Epidote	tr	-	-	tr	-	-

Note : tr = trace



EXPLANATION

- ▭ = Hut
- ⊠ = Manual rain gauge station
- ⟋ = Wind direction
- --- = Dike
- —·— = Drainage
- ⊡ = Climatological station

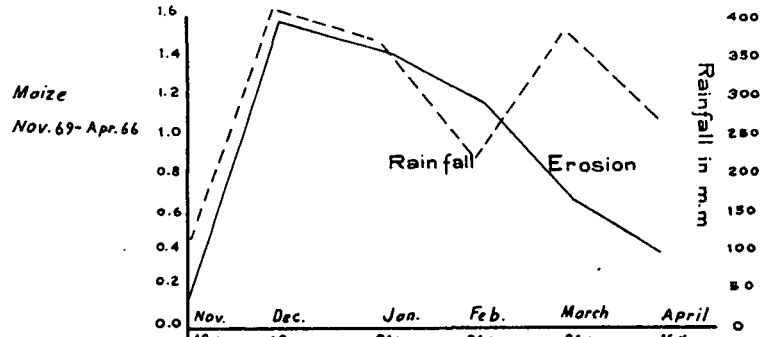
Institute of Hydraulic Engeneering Hydrology Division DJ. KIDANG PANANDJUNG 2 BANDUNG-INDONESIA	WASPADA EXPERIMENTAL BASIN			
	Scale 1:5.000			
	MEASURED BY HIDROLOGY DIVISION	PROVINCE	DICTRIC	CADASTER Rt: 26
	DRWED BY OENEN.S	WEST JAVA	GARUT	TOTAL SHEETS:
				SHEET.NO

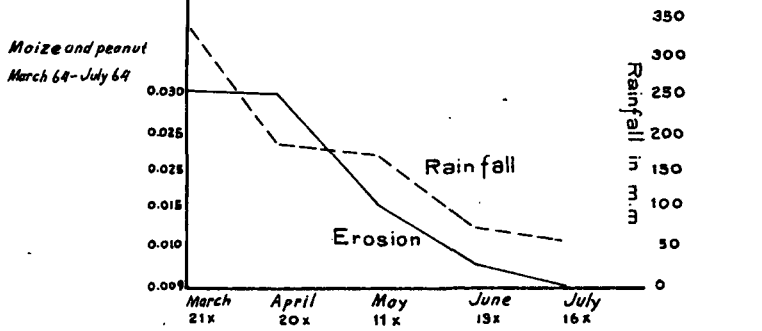
FIG. 18

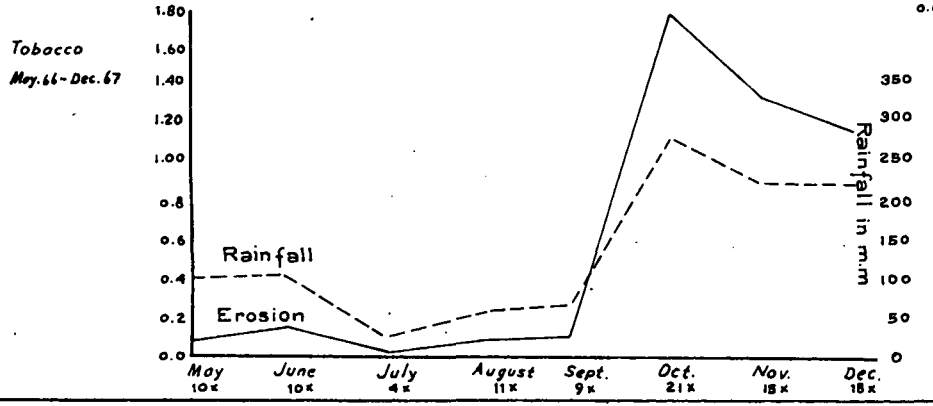
Erosion and % run - off for several periods, at Waspada

FIG. 19

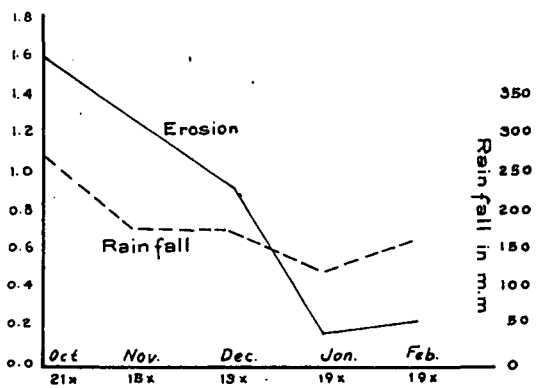
Erosion and Rainfall for several periods at Waspada experimental basin



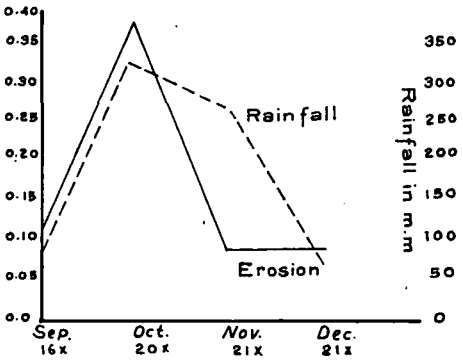




Maize from October 1966 to February 1967



Maize and sweet potatoes from September 1964 to December 1964



Potatoes from May 1966 to December 1967

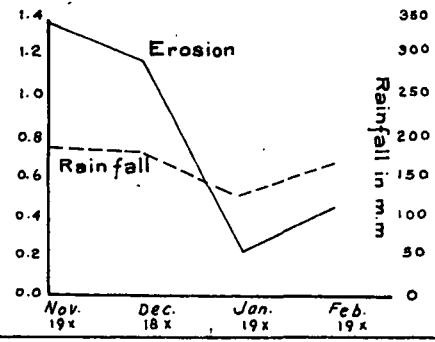


FIG. 20

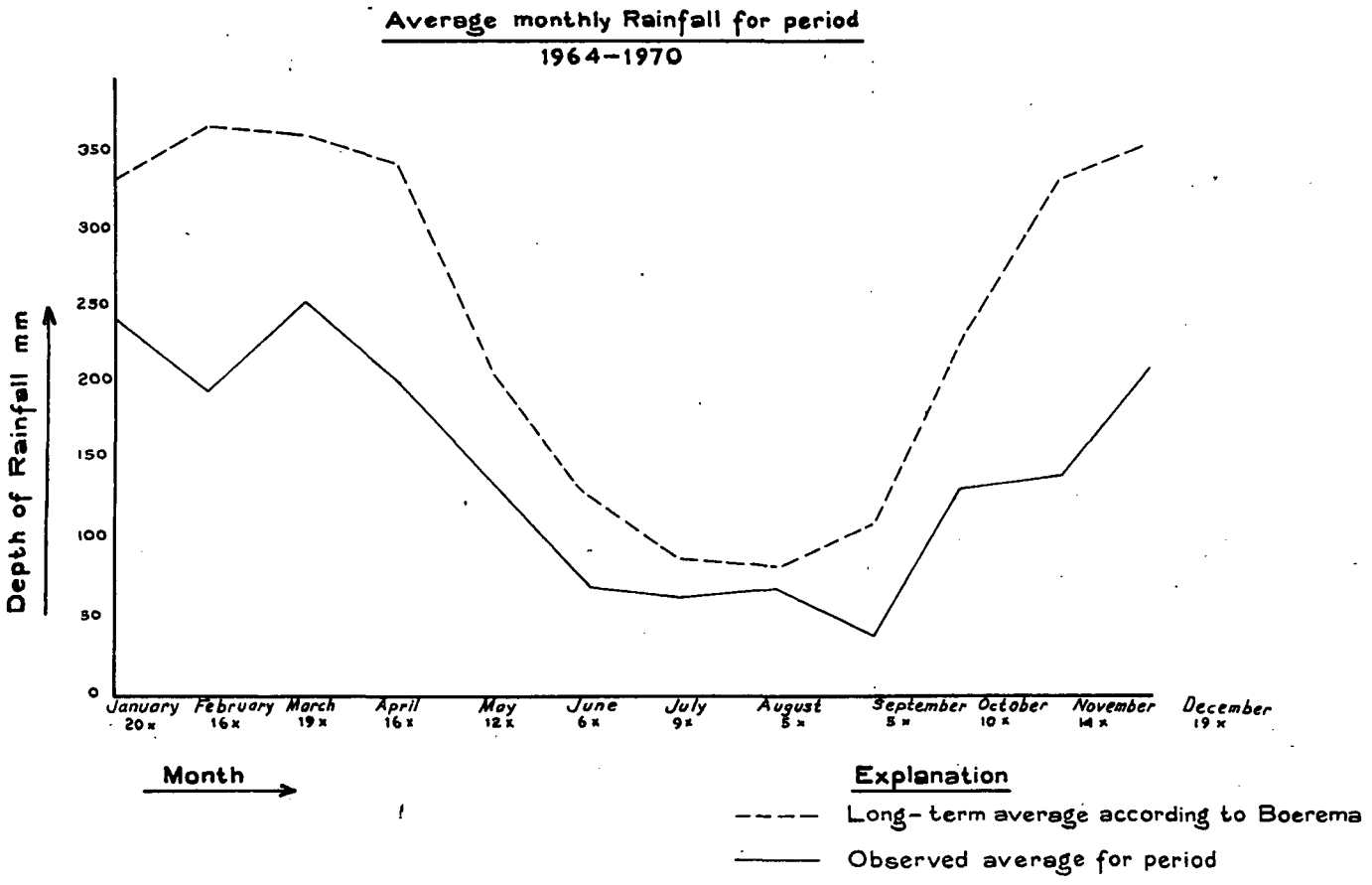

Average monthly Rainfall for period
1964–1970
Depth of Rainfall mm
350
300
250
200
150
100
50
0
January 20 x
February 16 x
March 19 x
April 16 x
May 12 x
June 6 x
July 9 x
August 5 x
September 5 x
October 10 x
November 14 x
December 19 x
Month
Explanation
Long-term average according to Boerema
Observed average for period

FIG. 21

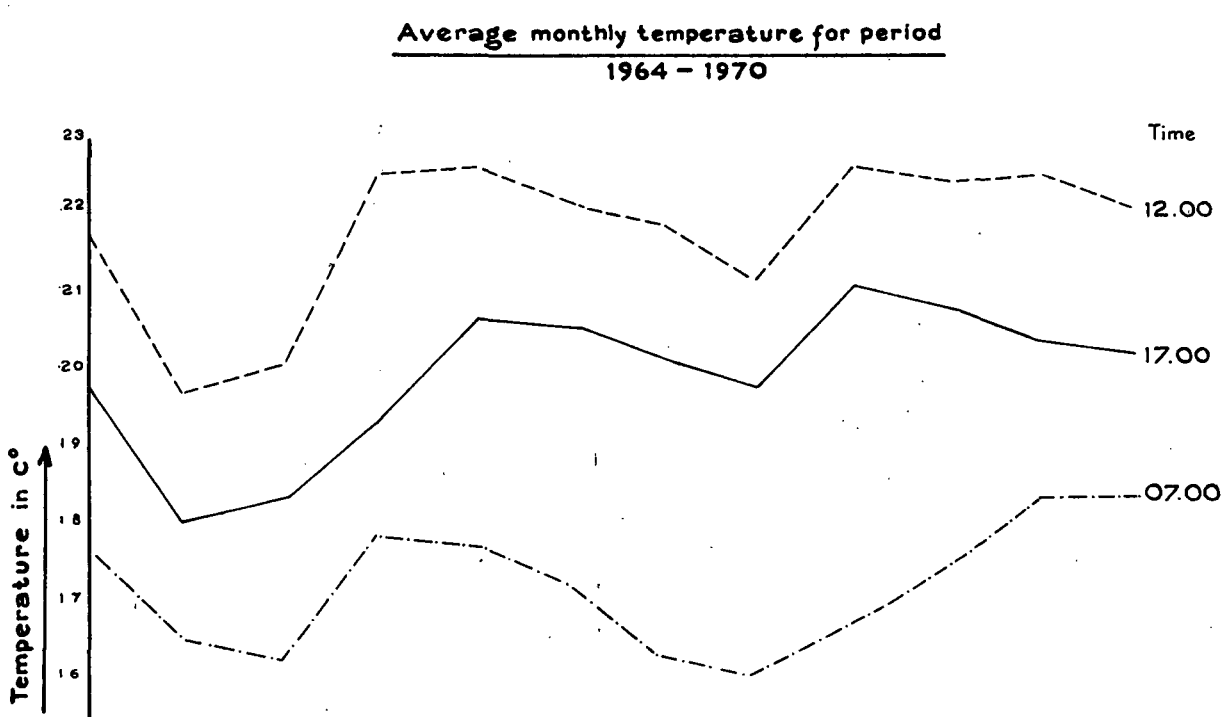
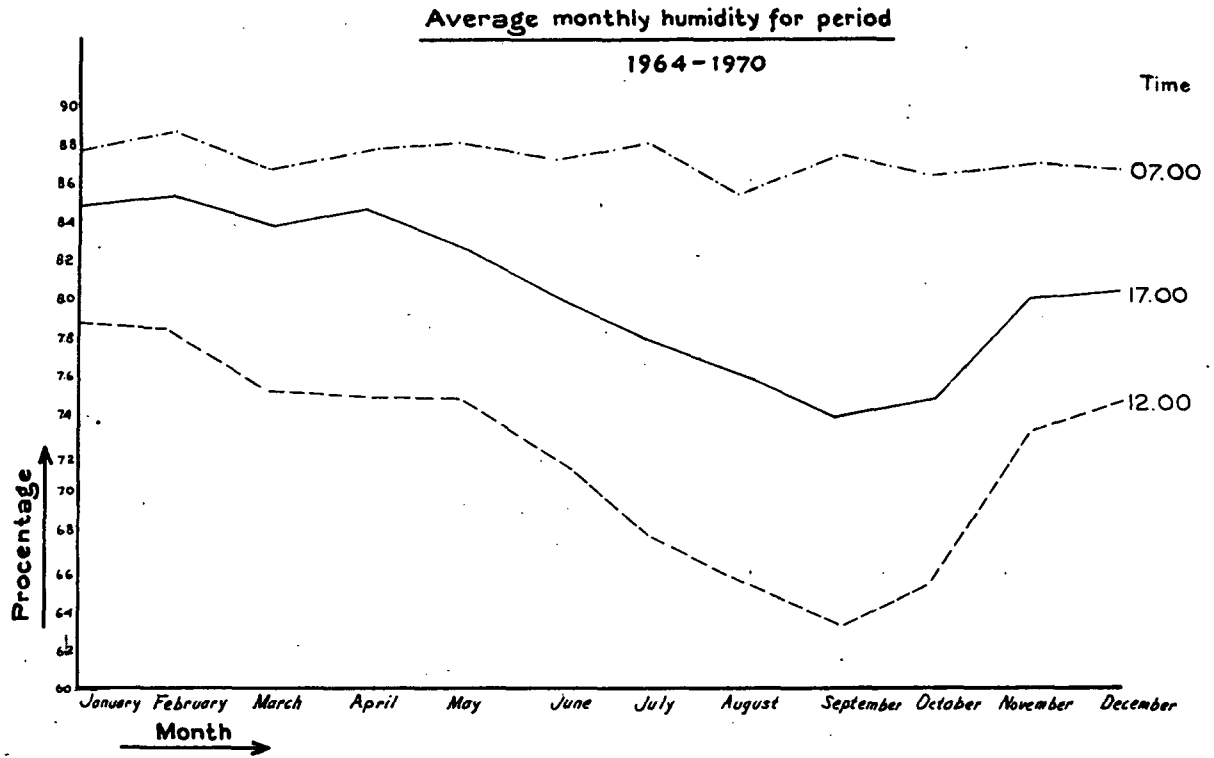

Average monthly temperature for period
1964 – 1970
Time
12.00
17.00
07.00
Temperature in C°
23
22
21
20
19
18
17
16
15
January
February
March
April
May
June
July
August
September
October
November
December
Month

FIG. 22


Average monthly humidity for period
1964 - 1970
Time
07.00
17.00
12.00
Procentage
90
88
86
84
82
80
78
76
74
72
70
68
66
64
62
60
January
February
March
April
May
June
July
August
September
October
November
December
Month

Site-6c: Mediterranean soil and landuse in Karangpawitan

Garut is a well known place for citrus in Java. The citrus plantation of this area have dropped from 2,700 ha in 1964 to 270 ha in 1970. From the investigation done, this serious damage was caused by a virus disease. Although the intensive us of other crops followed (table 12), the income of the farmers (citrus farmers) is still too small. To overcome this problem the Extension Service established the "Citrus Rehabilitation Pilot Project" as a joint project with the Agricultural Faculty of the University of Padjadjaran.

Karangpawitan is one of these citrus centres about 15 km east of Garut. The "Citrus Seed Centre" of the Local Extension Service in Karangpawitan will be visited.

The soils of this area can be classified as Mediterranean. Morphological description and analytical data are presented (Table 12). The toposequence of the soils in this area, which has a rather dry climate and basaltic material, consists from the top downwards of Andosol, Latosol and Mediterranean soil (map IIIb).

Zie foto: In papaja en de koonsoort (groenbemesting) jonge citrus.

Table - 12

Inst. number	: 160048/051
Location	: Situgede, Karangpawitan, Garut, West Java
Classification	: Mediterranean soil – Reddish prairie soil. (7th app.: ~~Andic tropudulf~~) Vertic Tropudalf.
Geomorphology	: Colluvial material from Mt Telagabodas / Kratjak
Parent material	: Basic volcanic tuff
Elevation	: ± 800 m above sea level
Climate	: Type Aw, annual rainfall 1895 mm Mean dry months: 3,3; mean wet months: 7,5
Landuse	: Citrus garden with papaya; green manure or catch crops

Description :

0 - 20 cm	$A_{1.1}$	Dark reddish brown (5 YR 3/2, 3/3), silty loam, strong coarse subangular blocky to crumb, firm, clear smooth boundary,
20 - 40 cm	$A_{1.2}$	Dark reddish brown (5 YR 3/2), silty loam, strong coarse angular blocky, firm, gradual smooth boundary,
40 - 55 cm	$B_{1.t}$	Dark reddish brown (5 YR 2/2), silty clay loam, strong coarse angular blocky, few clay skin, firm, diffuse smooth boundary,
55 - 150 cm	$B_{2.t}$	Dark reddish brown (5 YR 2/2), clay, strong medium angular blocky, friable to firm.

Zeer duidelijke B2t. Zeer gr. prisma's
Donkere kleuren Hoge biol. act.
Moedermat. all. met tufsteen
Textuur zeer zwaar
Vertic omdat scheuren 4 [illegible] > 1 cm
Niet vanwege slickensides
ontbreken geheel!

Analytical data

Inst. No.	Depth (cm)	Texture			100 gr of fine earth < 2 mm Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
160048	0 - 20	28,7	51,8	19,5	2,25	0,31	7	89	46	7,0	5,8
049	20 - 40	20,2	61,0	18,8	1,02	0,11	9	37	76	7,4	5,4
050	40 - 55	10,0	53,0	37,0	1,36	0,10	14	30	12	7,3	5,5
051	55 -170	4,3	42,6	53,1	1,45	0,09	16	33	8	7,0	5,4

Inst. No.	Total cation (S) m.e.	Adsorption capacity CEC(T) %	Base saturation (B) %	SiO_2 / Al_2O_3	SiO_2 / R_2O_3
160048	19,5	33,6	58		
049	19,6	36,0	56		
050	21,5	37,4	57		
051	23,7	40,9	58		

Mineral composition of the sand fraction

	Institute number			
	160048	160049	160050	160051
Fraction	IV	IV	IV	IV
Opaque	5	1	10	7
Quartz (turbid)	tr	tr	-	-
Iron concretion	13	6	17	42
SiO_2 (organic)	-	-	tr	-
Zeolite	-	-	-	-
Miscellaneous	5	3	9	27
Rock fragments	23	26	14	4
Plagioclase (int.)	16	5	14	1
Plagioclase (bas.)	9	20	13	1
Hornblende (green)	1	3	2	5
Hornblende (brown)	-	-	tr	-
Augite	13	17	9	4
Hypersthene	3	2	8	4
Olivine	13	17	4	5

Note : tr = trace

Site-7 : Lava flow and vegetation of the Guntur volcano

The Guntur is a strato volcano (2249 m above sea level, or 1550 m above the Garut plain). This volcano consists of several volcanic cones, and is called a polyconide (TAVERNE, 1926). The young craters lie on the north west and the older ones on the north east.

Between 1800-1847 not less than 21 eruptions were recorded, the most severe ones were those of 1818-1825 and 1843, which caused catastrophes and cansualties. They were generally of short duration, throwing out ashes and glowing stones. After 1947, no eruptions at all have taken place, and the volcano is in a fumarolic stage.

A considerable lavastream flowed from the young crater on the slope of Guntur in the south east direction. What can be seen from the road is the lava stream of May 23, 1840. The rock of this lavastream is basalt. Elsewhere andesites are common. Is very porous.

Op zeer dunne asgronden op de jonge lava : hier en daar tabak

The vegetation found on the lava flow mainly consists of Graminae, e.g. Arundinella setosa TRIN, Microstegium rufispicum HENZ. which adapted to the dry condition of the area. It contrasts with the surrounding at the same elevation where Latosol and Andosol are found.

From the lava flows the scenery is beautiful over this densely populated plain supplied with chemically richwater (See table-2).

Zie foto's

Visgyras

Site - 8 : Entertainment West Javanese dances

The following aspects of Javanese culture can be seen near Bandung and Garut.

1. "Tjalung"

Parahiyangan is known as a prosperous area. Bamboo is one of the many plants which grow in this fertile area. It is a good material for music instruments. This plant give so many possibilities that it can also be used for furniture, walls, umbrellas etc. The "Tjalung" is one of them. It reflects the Sundanese character which is divert, simple and happy.

2. "Gondang"

Is a traditional folk song performed during the harvest time :

a. the first part shows people praying Dewi Sri the goddess of rice.

b. the second part shows the young girls after the successful harvest.

c. the third part "gogondjakan" illustrates the romantic play between the young boys and girls of the village.

Zie foto's

Zij stampen de rijst met ritmische bewegingen en slaan hun stokken afwisselend op de vloer of tegen elkaar!

3. "Ketjapi suling"

A combination of the "ketjapi" a string instrument and the "suling" a bamboo flute accompanied by singers.

4. "Pentjak"

A traditional fighting dance; a combination of art and sport.

5. "Angklung"

This is a typical Sundanese music using several bamboo instruments.
Mr Daeng Sutigna is the master who manufactures these simple instruments. Ook in Bandung gezien.

6. "Degung"

This is a gamelan orchestra consisting of typical Sundanese music instrument like the "Suling" (bamboo flute).

7. "R e o g"

This is a performance of four to five commedians, each carrying a drum of different size. During this performance they dance, sing and joke.

8. "Sundanese Dances"

These illustrate traditional stories and ancient legends. Telkens heel kort

9. "The Butterfly Dance"

It symbolises the gay life of the butterfly. It begins at the coccon stage and develops to the stage where the insect is depicted fluttering from flower to flower.

10. "Topeng or Mask Dance"

This presents a picture of an arrogant king, the king of Blambangan, who thinks himself superior to other kings.

Was zeer goed

11. "Tenun Dance"

Symbolises the art of weaving it is a newly created dance.

12. "Andjasmara Dance"

Classical Sundanese dance based on an ancient legend.

13. "Ketuk Tilu"

A joyful folk dance showing the villagers' pleasure after a good harvest. The audience may join the dancers, as this one is not difficult.

Succes van Jaap tegenover Student Klaverblad

14. "Wajang Golek"

A show, by wooden puppets which is a popular attraction and is performed on certain traditional occasions, such as a "perkawinan" (wedding ceremony) or a "chitanan" (circumcision). The story is usually borrowed from the "Mahabarata" and the "Ramayana" epics which have their origin in India. The wajang show are accompanied by a gamelan orchestra and its "pesinden" (lady singers at gamelan).

Site - 9 : <u>The country of the ten thousand hillocks of the Galunggung volcano near Tasikmalaja</u>

In this "country of the ten thousand hillocks" (numbering stone 3600) hills of different heights are spread fanlike in front of the enormous Galunggung breach. These hills are separated from each other by small alluvial plains. The crater of the volcano itself has the shape of a horse shoe in the middle of which there is a lava plug.

This group of hillocks were formed by some sort of wet lahar (Escher, 1925). It is also possible that huge landslides were set in motion by earthquakes and tectonic movements, or by ultra volcanic explosions (Van Bemmelen, 1949). As stated in the chapter on geology (page 26,27) such symptoms might also have been caused by the tremendous blasts of the eruptions (Gorshkov).

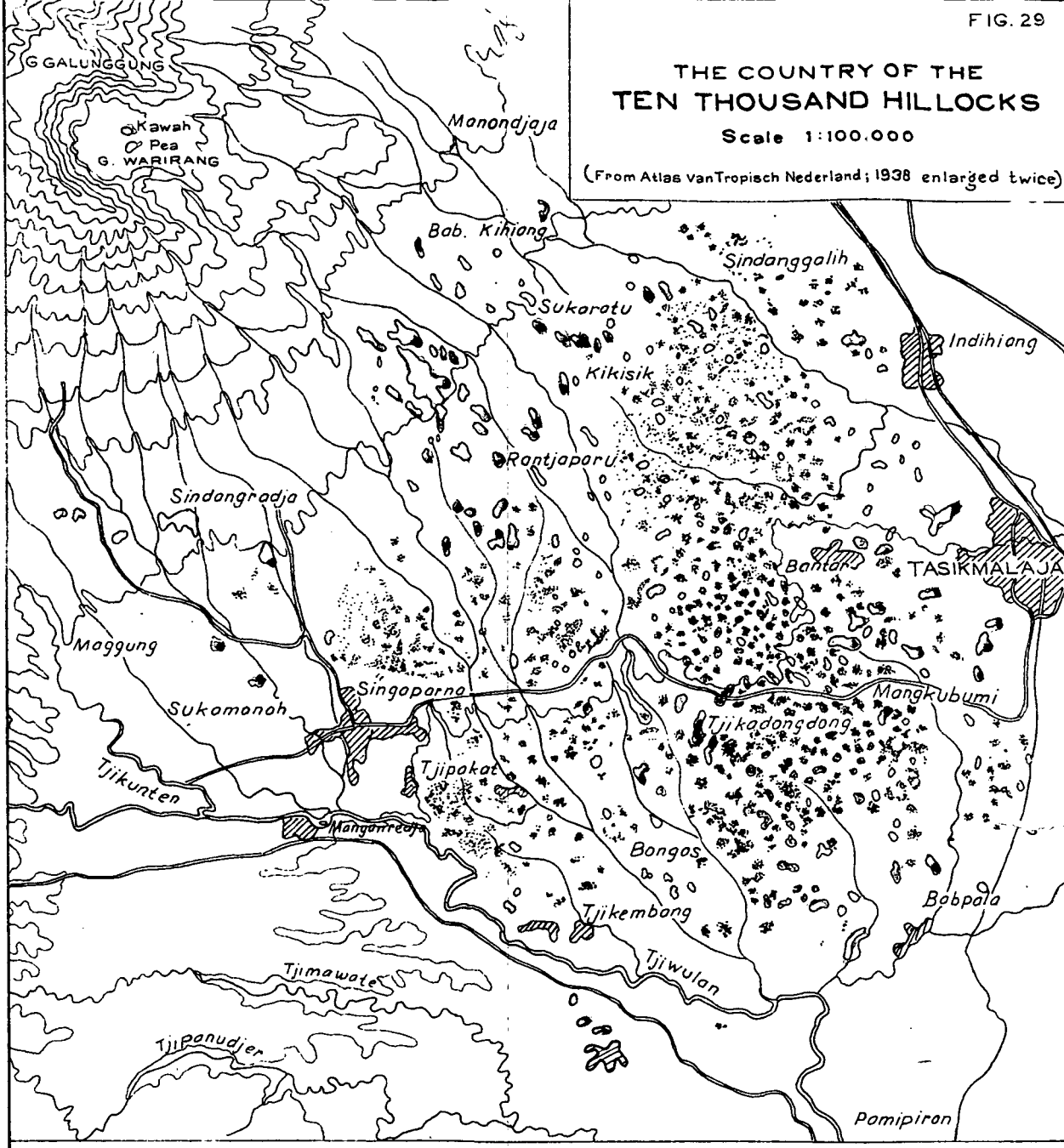
The rocks at the foot of the volcano are olivine containing pyroxene andesite with large crystals of hypersthene, and basalt. The sand fraction from some sites in the hillocks consists mainly of feldspars, rock fragments, iron concretions, and few pyroxene and olivine; the heavy fraction belongs to the mineral association of pyroxene.

FIG. 29

THE COUNTRY OF THE TEN THOUSAND HILLOCKS

Scale 1:100.000

(From Atlas van Tropisch Nederland; 1938 enlarged twice)



Drafted by: Sudarman

LEGEND:

- Roads, Villages
- Rivers
- Lake
- Hillocks
- Tranches
- G (GUNUNG) Volcano/Mountain
- Kawah : Crater
- Tji : River

Drafted by: Sudarman

Soils covering the hillocks and plain are still weakly developed and are classified as Regosolic Lithosols and Alluvial soils. Morphological descriptions and analytical data are presented in table - 13 and - 14.

The hillocks are usually planted with bamboo and coconut, the plain being occupied by wet rice fields and fish ponds.

Tasikmalaya is het centrum van de Batik industrie van West Java (Soendanees)

Table - 13

Inst. number	: 159176/181
Location	: Gunung Djambe, Tasikmalaja, West Java
Classification	: Regosolic Lithosol (7^{th} app.: Typic Hapludoll)
Geomorphology	: Isolated volcanic blocks
Parent material	: Andesitic colluvial volcanic materials
Elevation	: ± 150 m above sea level
Climate	: Type Am, annual rainfall 3580 mm. Mean dry months: 1.8; Mean wet months: 9.5
Landuse	: Dry field and villages, wet rice field in the valleys among the blocks.

Description:

0 - 25 cm A	Dark brown (10 YR 3/3 - 7,5 YR 3/2), clay, weak - medium to fine subangular blocky to crumb, friable, many gravels/stones, abrupt smooth boundary,
25 - 60 cm C	Brown (7,5 YR 4/4), sandy loam, structureless, firm, clay bridges, clear smooth boundary,
60 + cm R	R o c k

Zie foto van een afgraving in één van de heuvels (2x)
Het materiaal is :- onverweerd
- met vloeistructuur
verwrongen steenlagen afgewisseld met dus, een
- heeft een fijne textuur die ondiep is.

Bruine grond met donkere bovengrond

Table - 13 Continued

Analytical data

Inst. No.	Depth (cm)	Texture			100 gr of fine earth < 2 mm Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
159176	0 - 25	19.8	36.3	43.9	3.42	0.31	11	27	36	6.4	4.9
177	25 - 60	61.1	30.8	8.1	0.67	0.04	17	33	14	6.3	4.7
178	60+	83.3	15.2	1.5	0	0	-	25	9	6.8	5.4
179	-	50.7	47.3	2.0	0.13	0	-	15	31	6.5	4.3
180	-	81.5	15.9	2.6	0	0	-	12	14	6.2	4.8
181	-	87.5	11.2	1.5	0	0	-	23	18	nd	nd

Inst. No.	Total cation (S) m.e.	Adsorption capacity CEC(T) %	Base saturation (B) %	SiO_2	
				Al_2O_3	R_2O_3
159176	19.7	38.7	51	1.24	1.14
177	9.5	19.3	49	1.56	1.37
178	2.6	3.0	87	nd	nd
179	12.4	20.1	62	nd	nd
180	1.3	3.4	38	nd	nd
181	1.5	2.6	58	nd	nd

Note : nd = not determined

Mineralogical composition of the sand fraction

	Institute number					
	159176	159177	159178	159179	159180	159181
Fraction	IV	IV	IV	IV	IV	IV
Iron concretions	14	29	6	18	45	4
Miscellaneous	14	13	-	17	-	-
Rock fragments	22	18	63	22	15	46
Volcanic glass	-	-	1	-	-	-
Plagioclase (int.)	2	-	-	2	-	-
Plagioclase (bas.)	28	35	28	37	38	49
Hornblende (green)	1	-	-	-	-	-
Augite	4	2	1	1	2	tr
Hypersthene	4	2	-	1	-	-
Olivine	11	1	1	2	sp	1

Note : tr = trace

Table - 14

Inst. number	: 159172/175
Location	: Gunung Djambe, Tasikmalaja, West Java
Classification	: Alluvial soils (7^{th} app.: Tropaquent)
Geomorphology	: Valleys among the isolated hills
Parent materials	: Alluvial and Colluvial materials
Elevation	: ± 240 m above sea level
Climate	: Type Am, annual rainfall 3600 mm; Mean dry months: 1.8; Mean wet months: 9.5
Landuse	: Irrigated ricefield

Description:

0 - 15 cm A_1	Grey (10 YR 5/1), clay structureless, nonsticky, abrupt smooth baundary
15 - 50 cm C_1	Grey (10 YR 5/1), clay slightly massive, brittle, firm to non sticky, abrupt smooth boundary
50 - 65 cm C_2	Grey (2.5 YR 5/0), clay loam (field), slightly massive, brittle, firm, abrupt smooth boundary
65 + cm II B	Brown to dark yellowish brown (10 YR 2/3-4/4), clay loam, massive, firm, many stones, many reddish brown mottles (fragipan).

Table - 14 Continued

Analytical data

Inst. No.	Depth (cm)	Texture			100 gr of fine earth < 2 mm Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
159172	0 - 15	10.4	38.0	51.6	1.92	0.16	12	8	11	5.3	4.0
173	15 - 50	11.4	44.3	44.3	0.49	0.05	10	11	11	5.8	4.4
174	50 - 65	14.6	49.0	36.4	0.63	0.05	13	24	21	3.8	4.9
175	65+	23.2	48.3	28.5	0.23	0.00	-	22	24	6.9	4.9

Inst. No.	Total cation (S) m.e.	Adsorption capacity CEC(T) %	Base saturation (B) %	SiO_2	
				Al_2O_3	R_2O_3
159172	17.9	35.1	51	1.82	1.62
173	33.5	49.8	67	1.40	1.25
174	37.2	47.5	78	1.40	1.20
175	35.7	48.4	74	1.60	1.46

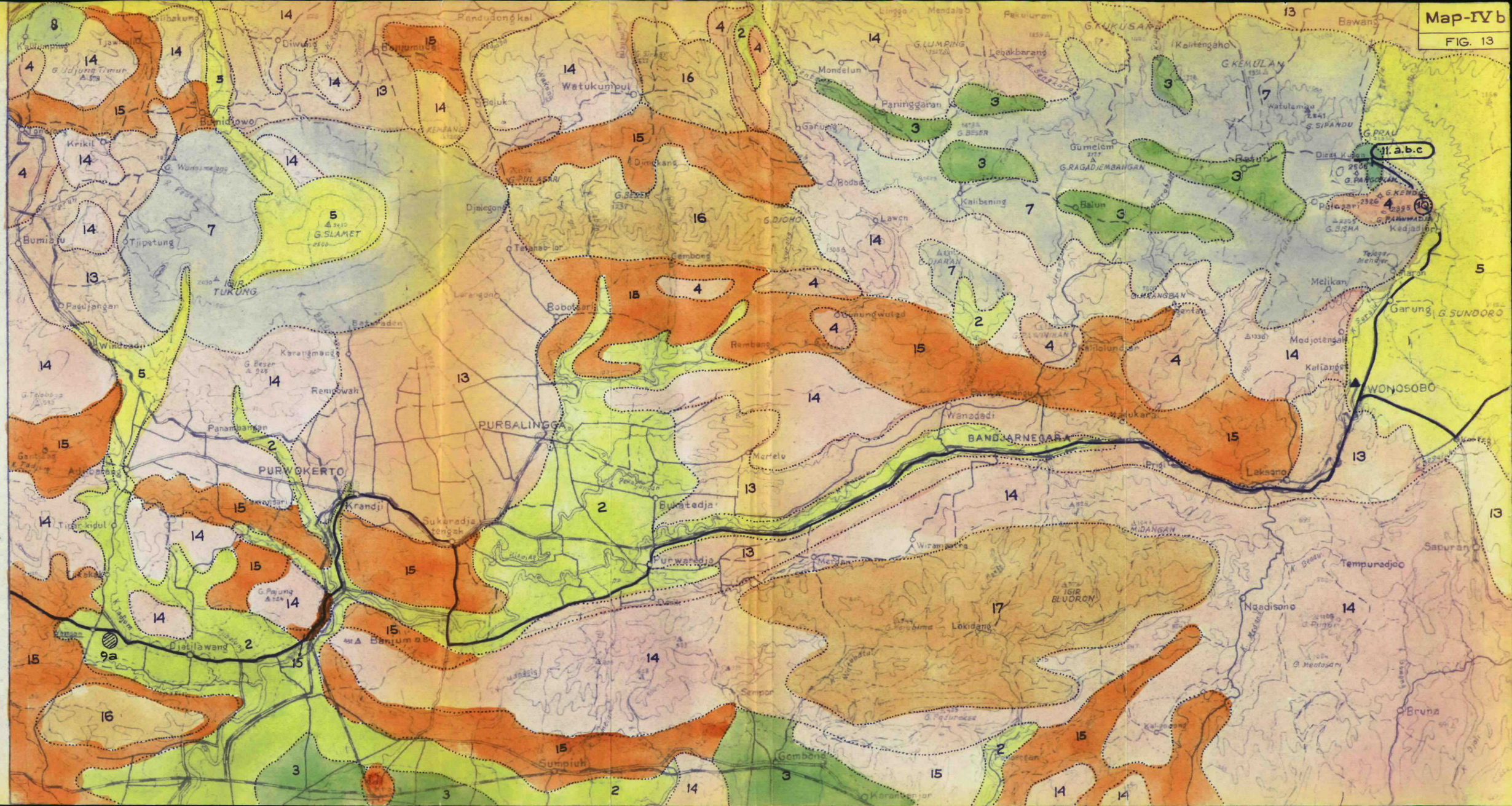
Mineralogical composition of the sand fraction

	Institute number			
	159172	159173	159174	159175
Fraction	IV	IV	IV	IV
Opaque	-	1	-	1
Iron concretion	3	10	7	4
SiO_2 (Organic)	tr	-	-	-
Miscellaneous	35	51	56	54
Rock fragments	19	8	7	5
Plagioclase (int.)	2	2	6	4
Plagioclase (bas.)	21	24	18	20
Hornblende (green)	3	-	-	tr
Hornblende (brown)	tr	-	-	-
Augite	11	2	4	2
Hypersthene	6	2	2	tr

Note : tr = trace

Map-IV b

FIG. 13



Site-9a: Irrigation development project "Tadjum" in Wangon

Based on an agreement signed in Djakarta on February 16th, 1971 between the Government of Indonesia and Japan, an Agricultural Development Pilot Scheme of the Tadjum project was established.

The project covers an area of 206.5 hectares of rice field. The irrigation water is supplied by the main canal of Tadjum. Three hectares are selected for the pilot centre; it is located in Tinggardjaja village, kabupaten (country) Banjumas (Central Java province).

The Japanese aid provides the machinery, the equipment and supplies while the handling costs and all the buildings are taken in change by the Government of Indonesia.

The objectives of the Project are as follows:

1. to demonstrate to farmers the best water management on rice fields and to give them advices on intensification
2. to serve within three next years as Centre for Agricultural Extension.

At present the activities of the Project consist of planning and construction of the drainage and the tertiary irrigation ditches, as well as village roads; demonstrations and technical guidance to farmers; training of Agriculture Extensionists and associated outstanding farmers; establishment of an organization or farmer association within the project.

Site - 10 : The Scenery of Sitieng

This place is located about 1500 m above sea level, and is surrounded by volcanoes. In the west these volcanoes lie in a row and include Mt Sarodja, Mt Kunir , Mt Prambanan, Mt Pakuwadja and Mt Kendil. In the north east Sitieng is bordered by Mt Djuranggrawah and Mt Tlerep. Most of these mountains have an open crater, single or multiple.

Sitieng is situated close to Dieng between Dieng and Wonosobo. The landscape of this area is fascinating, with steep slopes, deep ravines and scattered grey rocks. Terracing by means of low stone walls is widely practised and adds to the beauty of the scenery.

The area is famous for its beautiful colours; the dark green of the forest in the mountain tops, the white of the pyrethrum flowers, the different shades of yellow of the many flowers of vegetables and other crops, and the soft green colours of the tobacco plantations are mixed with the colours of the villages.

Site-11: Soils, landuse and geology of Dieng plateau.

This is a complex volcanic mountain with several cones and solfatara fields. The Mt. Perahu (2565 m) occupies the northern side. Most of the cones consist of cinders. In a few of them lava is found (Fig. 30).

The latest eruption took place in 1944, Kawah Sileri; while the solfataric activity is rather extensive. The temperature of the solfatara fields fluctuates between 85-93½°C. Increased solfataric activity was mentioned in December 1883 and February 1895.

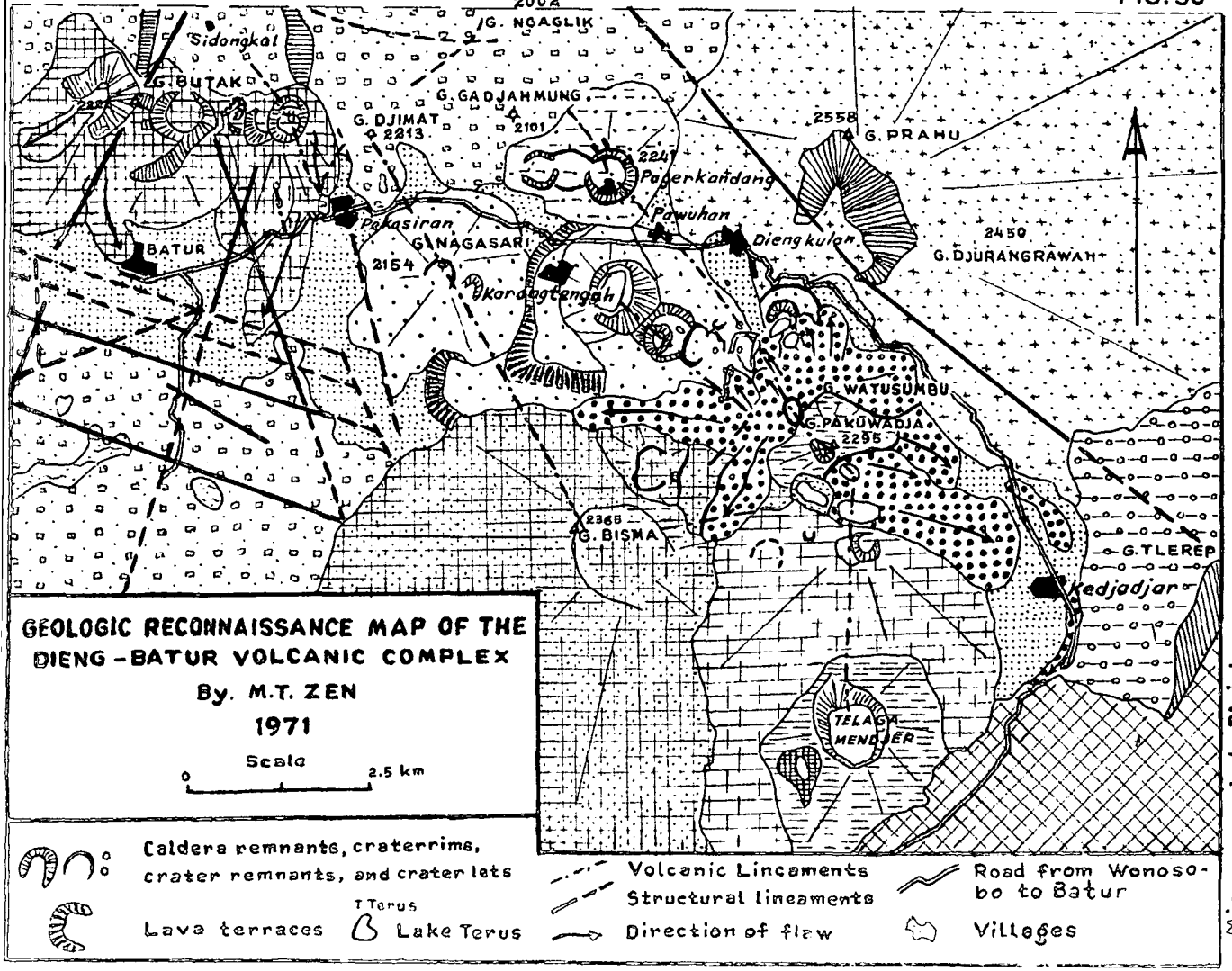
The volcanoes of Dieng have built up the ground so much with lava and fragmental ejecta, that a high plain was formed; that is the so called Dieng Plateau. One can find there several lakes; among which "Telaga Warna", "Telaga Pengilon", "Telaga Terus", Telaga Lumut", "Telaga Balekambang". (Telaga = lake). The plain extends over more than 2000 m and covers an area of 5 km2 with a minimum temperature of 4°C and an average temperature of 16°C. The annual rainfall varies from 3500 mm to 4000 mm.

(a) Organosol/Humic Gley Soil.

Where the soil is not permanently cultivated the organic residues accumulate and black soils are formed: Andosol and Humic Regosol. In those places where the surface soil has been removed the surface is yellow in colour: In swampy conditions Organosol developed. Morphological descriptions and analytical data are given in Table 15 and 16.

Organosol is still left idle, while the other soils

FIG. 30



LEGEND

Early Holocene to Recent

- Intervolcanic Tuff Plain
- Undifferentiated products from Mt. Sundoro
- Quartz latites of Pakuwadja
- Rhyodacitic lava domes
- Rhyodacitic lavas
- Labradorite-rhyodacitic products of Butak-Petarangan-Sedringo volcanoes
- Labradorite trachyandesites from Pagerkandang volcano
- Trachyandesites of Young Srodja
- Trachyandesites of Pangonan-Merdada I. Binem and Nagasari volcanoes
- Labradorite andesites of Mendjer and parasitic cone
- Olivine containing andesites of Mt. Bismo

Late Pleistocene to Early Holocene

- Lava-and-tuff breccias tuffs and Light pigeonite lavas from Mt. Prau
- Undifferentiated products of Butak-Tlerep volcanic Ruin

Plio-Pleistocene

- Undifferentiated products from the Eastern Djembangan volcanic complex

Mio-Pliocene (?)

- Shales, shaly-marl and limestone

Table - 15

Inst. number	: 160043/047
Location	: Diengkulon, Bandjarnegara, Central Java
Classification	: Humic Gley soil (7th app.: Andaquept)
Geomorpholgy	: Basin
Parent material	: Alluvial/Colluvial material
Elevation	: ± 2000 m above sea level
Climate	: Type Cw, annual rainfall 3719 mm Mean dry months: 2,2; mean wet months: 8,5
Lan duse	: Dry farming (maize, vegetable and flowers)

Description:

0 - 20 cm	A_1 I	Very dark brown (10 YR 3/2), silty loam, weak fine crumb to subangular blocky, friable, many fine and medium roots, gradual smooth boundary,
20 - 50 cm	II	Very dark brown (10 YR 2/2), silty loam, weak medium crumb to subangular blocky, friable, few fine gravel few fine and medium roots, gradual smooth boundary,
50 - 100 cm	III	Dark grey (10 YR 4/1), silty loam, pseudoglei, massive firm, many medium distinct mottles, abrupt wavy boundary,
100 - 130 cm	IV	Brown (7,5 YR 5/4, 4/4), silt, many gravels, massive, firm, many medium Fe mottles (fragipan),
130 + cm	V	Dark brown (10 YR 3/3), silt, strong medium subangular blocky, slightly sticky.

Note : See page water at 100 cm

Analytical data

Inst. No.	Depth (cm)	Texture			100 gr of fine earth ⩽ 2 mm Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
160043	0 - 20	23.5	73.0	3.5	8.88	0.94	9	290	20	5.7	5.1
044	20 - 50	19.9	76.7	3.4	8.67	0.87	10	432	17	5.6	5.2
045	50 -100	27.9	67.5	4.6	6.24	0.63	10	514	18	6.3	5.5
046	100-130	11.4	85.1	3.5	5.39	0.51	11	168	30	6.4	5.9
047	130+	16.0	82.3	1.7	2.71	0.36	8	167	14	6.4	5.8

Inst. No.	Total cation (S(m.e.	Adsorption capacity CEC(T) %	Base saturation (B) %	SiO_2 / Al_2O_3	SiO_2 / R_2O_3
160043	1.9	54.0	4	-	-
044	2.5	66.8	4	-	-
045	3.1	51.5	6	-	-
046	2.5	63.8	4	-	-
047	3.5	55.3	6	-	-

Mineral composition of the sand fraction

	Institute number				
	160043	160044	160045	160046	160047
Fraction	IV	IV	IV	IV	IV
Opaque	-	1	-	1	1
Quartz (turbid)	-	-	1	-	1
Iron Concretion	13	8	6	36	24
SiO_2 (organic)	-	1	-	-	-
Zeolite	-	-	tr	1	1
Miscellaneous	6	4	8	6	13
Rock fragments	32	22	28	19	37
Volcanic glass	18	20	11	6	3
Plagioclase (int.)	19	26	28	13	11
Plagioclase (bas.)	-	tr	1	-	-
Plagioclase (bas.)	-	tr	1	-	-
Biotite	1	1	tr	3	-
Hornblende (green)	6	5	5	1	3
Augite	4	8	9	7	3
Hypersthene	1	4	3	7	3

Note : tr = trace

Table - 16

Inst. number	: 160035/037
Location	: Diengkulon, Bandjarnegara (Central Java)
Classification	: Organosol (grass peat) (7^{th} app.: Tropo Hemist)
Geomorphology	: Intermountainous basin
Parent material	: Grasses
Elevation	: ± 2000 m above sea level
Climate	: Type Cw; annual rainfall 3719 mm Mean dry months: 2,2; mean wet months: 8,5
Landuse	: Swampy grassland

Description :

0 - 40 cm	I	Dark reddish brown (5 YR 2/2, 3/3), silt, structureless, nonsticky, many rootprints, diffuse smooth boundary,
40 - 80 cm	II	Black (5 YR 2/1), silty loam, structureless, nonsticky, many rootprints, diffuse smooth boundary,
80 - (120)cm	III	Black (5 YR 2/1), silty loam, structureless, nonsticky, common rootprints.

Analytical data

Inst. No.	Depth (cm)	Texture			100 gr of fine earth <2 mm: Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
160035	0 - 40	2.2	83.7	14.1	23.67	1.00	12	117	25	5.9	5.4
036	40 - 80	1.7	73.0	25.3	14.93	0.96	16	36	3	5.5	4.8
037	80 +	20.7	69.0	10.3	25.87	2.32	11	83	5	5.6	5.0

Inst. No.	Total action (S) m.e.	Adsorption capacity (T) %	Base saturation (B) %	Wet digestion: N %					
160035	9.5	54.0	18	4.96	0.36	0.00	0.96	0.18	0.14
036	9.7	68.7	11	1.57	0.12	0.00	0.21	0.06	0.00
037	9.9	75.7	13	0.38	0.29	0.00	1.92	0.19	0.31

Mineral composition of the sand fraction

	Institute number		
	160035	160036	160037
Fraction	IV	IV	IV
Opaque	-	1	-
Iron concretion	9	-	-
SiO_2 (organic)	-	1	-
Miscellaneous	1	2	-
Rock fragments	32	41	30
Volcanic glass	25	7	14
Plagioclase (int.)	15	27	25
Plagioclase (bas.)	5	3	17
Hornblende (brown)	4	2	2
Augite	2	12	12
Hypersthene	7	4	tr

Note : tr = trace

are used for agriculture and planted with flowers, maize, high land vegetables and tobacco. The aroma of this tobacco is particularly excellent.

(b) The Hindu temples

The name Dieng may originate in the present Javanese words "Adi" and "Aheng" which mean "beautiful" and "fascinating". According to another more extremely theory, it derived from Dihyang ("Ardi" and "hyang") which means "the mountain (or place) where the Souls of dead ancestors reside". Ever since the eight century Dieng has been believed as a sacred place, the abode of gods and divine ancestors. But the name Dieng was not originated from that time. A stone inscription date on AD. 809 said that the place was dedicated to the god Siva, and no mention was made on the name of Dieng or di-hyang. The wajang names given to all the temples do not seem to date from those time. According to the Dutch archacologist, Dr W.F Stutterheim the names may have been given at the beginning of the 19th century.

The Dieng plateau is believed to be the abode of the wajang heroes. Wajang are the Javanese leather dolls, which represent characters playing stories based on true events of Central Java.

There are in all eight temples, called "Chandies" in Indonesian, which are more or less intact and each have a wajang name. They are those of the Ardjuno temples group (Ardjuno, Semar, Srikandi, Pendawa, Sembadra), Bima, Dwarawati and Gatotkatja. At present some of them are being restored. Besides these there are the foundations of some more

temples and of a number of "pendapas" (wooden halls), used for the priests, guardians and visitors.

The general shape of the Dieng temples show the influence of the Hindu or Indian style of architecture, but their name and general lay out also show the Javanese or Indonesian culture. Therefore, generally speaking, these temples are representative of Hindu-Javanese or Hindu-Indonesian culture.

In general the Dieng temples are square or quadrangular, with kala-makara (a monstruous head without the lower jaw and two mythical, aquatic animals, probably originating from the crocodile) and floral ornaments. The decoration is somewhat simple and not as refined as in Borobudur.

(c) The Mushroom industry

An important mushroom industry exists in the Dieng plateau with canning fasilities. Established in 1971 by P.T.Dieng Djaya ("Mantrust") a private enterprise. This plant is the largest of its kind in the world. It has now a unit consisting of 300 sheds, and a hut for champignon nursery. The initial plans for the following years amount to 2100 sheds. The biggest mushroom plant in Europe or Taiwan comprises not more than 100 sheds.

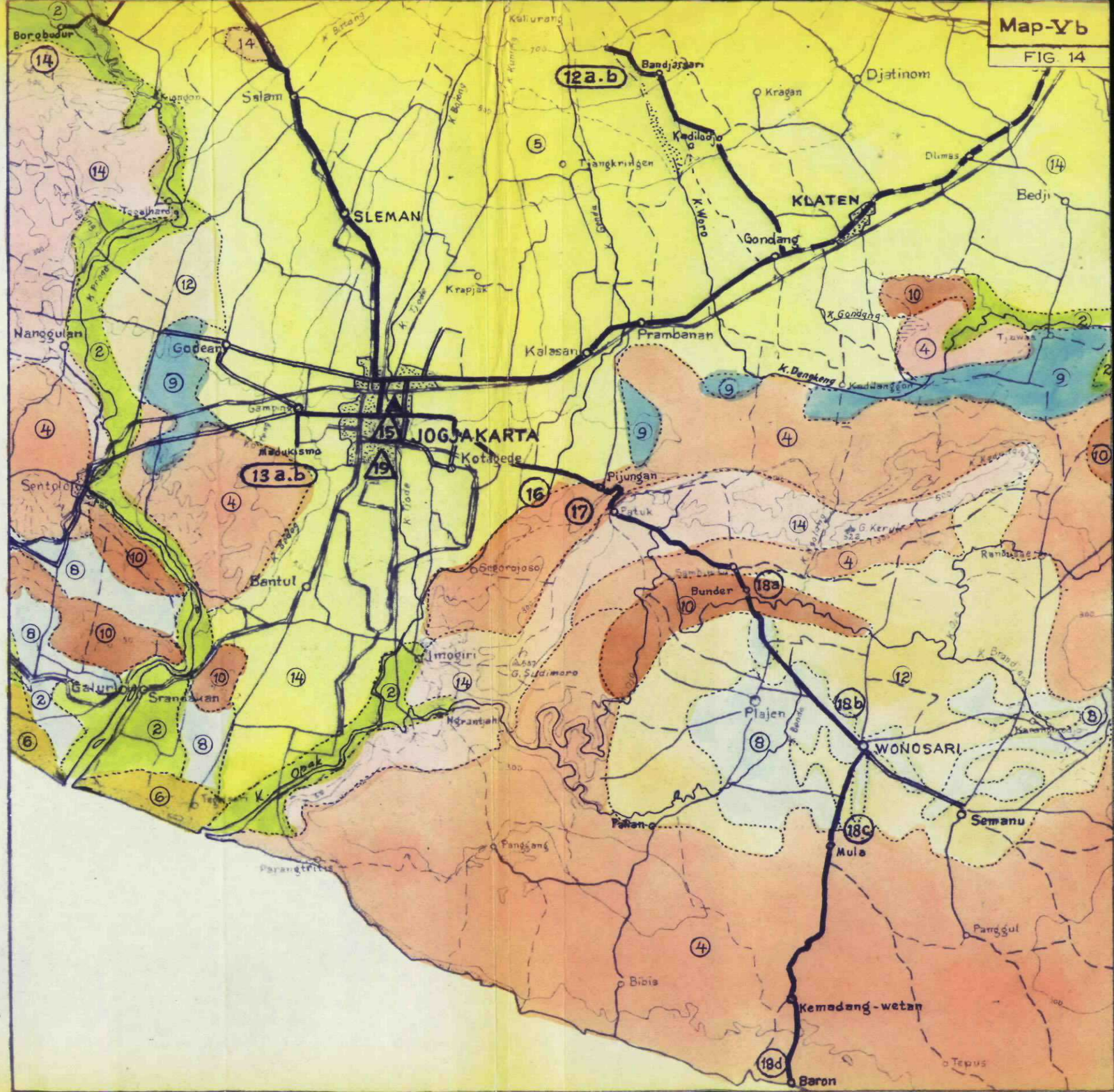
The champignon grown there(the french name for mushroom) is Agaricus campestris. Like the others vegetables, the champignon has a high water content (88 persent), a slightly high protein (2,7%), fats (0,3%) and a low carbohydrate(4,8%).. It also contains various vitamins (B1,B2,C), minerals and amino acids. For a full ripening it needs 2-3

months at 15° Celcius, of which 20 days at 25° Celcius are needed for nursering.

In the Dieng plateau, champignon is nursed on a shed, in a bamboo but also used for planting. The seeds are imported from Netherlands, Switzerland and Taiwan. After nursering, the mushrooms then are planted on a heap of high quality composts of rice straws, placed on storeyed bamboo rags. Each shed requires 12 tons of rice straw composts, and yield 25-30 kg champignon. Harvests are done every three months but there are only three harvests per year.

The best champignon are canned for export The rest with a lower quality is sold on the local and domestic markets. For June 1972 the first production of Indonesian champignons (with the lable of "the champignon of the Dieng mountain"), was exported to West Germany.

The composts that is not used for growing champignon is applied to experiments with temperate climate flowers, vegetables and fruits from Europe.
Melons, Dutch Tulps, various Dutch cabbages varieties, Red Arebei have been planted with excellent results and the first succesfull yield has been obtained. A factory of P.T.Dieng Djaya, for the export a dry vegetables has been considered.


Map-Vb
FIG 14
Borobudur
Salam
SLEMAN
Tegalhardjo
Nanggulan
Godean
Gamping
Maduksmo
Sentolo
Bantul
Imogiri
Galur
Srandakan
Opak
Parangtritis
Krapjak
Kalasan
Prambanan
JOGJAKARTA
Kotagede
Pijungan
Patuk
Gregorojoso
Bunder
Plajen
Panggang
Bibis
Kemadang-wetan
Baron
Tepus
Pamggul
Semanu
WONOSARI
Mula
Pathuk
Bandjaran
Kragan
Djatinom
Kadilodjo
Tjangkringan
Dlimas
KLATEN
Bedji
Gondang
Kaliurang
12a.b
13a.b
18a
18b
18c
18d

Post Conference Tour

Night stop

Entertainment

Site

Displays

Soil mapping Unit

LEGEND

Soil Map (I - II - III - IV - V) b

(Simplified from the Reconnaissance Soil Map of Java & Madura)

1 Organosol from grasses on nearly level region

2 Alluvial soil from recent deposits on level to undulating region

3 Gley soil from recent to sub recent deposits on level to undulating region

4 Lithosols, undifferentiated

5 Regosol from intermediate to basic igneous rocks on undulating to mountainous region

6 Regosol from aeolian deposits on undulating region

7 Andosol from intermediate to basic unconsolidated igneous rocks on hilly to mountainous region

8 Grumusol from limestone and marl on undulating to rolling region

9 Grumusol from intermediate igneous rocks on level to undulating land

10 Rendzina from limestone and marl on hilly region

11 Mediterranean soil from intermediate to basic igneous rocks on undulating region

12 Mediterranean soil from limestone on undulating to hilly region

13 Latosol from intermediate to basic igneous rocks on undulating to rolling region

14 Latosol from intermediate to basic igneous rocks on hilly to mountainous region

15 Red - Yellow Podzolic soil from claystone and marl on rolling to hilly region

16 Red - Yellow Podzolic soil from sandstone on rolling to hilly region

17 Red - Yellow Podzolic soil from acid metamorphic rocks on hilly to mountainous region

Note : in mountainous and hilly sites, these soils occur in association with other group (s)

Site-12: Protection measures against lahar and sandflow from the volcano Merapi

a. "Sand pocket" and levee construction in the Woro river. The "Sand pocket" system was developed by the Dept. of Public Works for the control of cold lahar, flows, which consist of sand masses moving downwards from the volcano, especially in the rainy season. The "sand pocket" are built in U-shape and can enclose several square kilometers. At the bottom of the "Sand pocket" a dam is constructed with a spellway to allow the water to run over.

b. Field experiments with bitumen emulsion.
The soils developed in lahar material have a very poor waterholding capacity and structure

The objective of the application of soil conditioners to this sandy material is the improvement of the physical properties of the soil to improve growing conditions for the plant roots. Suitable plants and planting methods should be selected for good results.

In preliminary field experiments 2 plant species were selected:

a. Cymbopogon citratus, an aromatic grass from which oil is extracted for medical purposes.

b. Andropogon zizanoides, a grass from which oil is extracted for the parfume industry.

Lay out of the trial

CN	AN	CT_5	AT_5
AT_2	CT_2	AN	CN
CN	AN	CT_5	AT_5
AT_5	CT_5	AN	CN

Tract

Legend:

C : Cymbopogon citratus

A : Andropogon zyzanoides

N : Control

T_2 : Treated with hydrophobic bitumenous emulsion: 1.5 liter/m2, dilution 2x

T_5 : Treated with hydrophobic bitumenous emulsion: 1.5 liters/m2, dilution 5x

Site - 13 : Madukismo ugar factory

The Madukismo Suga factory is situated about 2,5 km southwest of the city of Jogjakarta. This factory was rebuilt in 1958 and run by the Madubaru Sugar Factories Limited (Pabrik2 Gula Madubaru P.T.), resorting under the Government of Daerah Istimewa Jogjakarta. The factory consists of a sugar refinery and an alcoholic destilation plant as a side product.

The plantation area occurs as small plots around Jogjakarta mainly on Regosol region. The texture varies from plot to plot.

Detailed information about fertilization and processing from sugarcane to cristall, will be provided on the spot.

Site - 14 : Borobudur

The "Borobudur" is situated in the regency of Magelang (Kedu), 30 km north of Jogjakarta, and about 3 km south of Muntilan. This remarkable monument is undoubtedly one of the finest in the southern hemisphere and is only matched by Angkor Wat and Bajon in Cambodia, and Sanchi and Ajanta in India.

The Borobudur is surrounded by hills and mountains : by the Menoreh hills in the south by the Mounts Sumbing and Sindoro and the Ungaran-Telomojo Hills in the north and by Mount Merbabu and the active Merapi in the east. It lies on the confluence of the rivers Progo and Elo which are considered holy, like the holy Gangga and the Yamuna rivers in India. Borobudur is really a Buddhist sanctuary. It is not a real temple, but resembles a pyramid and is called a stupa. The stupa covers a natural hill. It became a sacred Buddhist monument, symbolyzing the Buddhist doctrines.

The name "Borobudur" seems to be a synthesis of the words "bara" from the Sanskrit "Vihara" which means a complex of temples and monasteries or dormitories, and "budur" which means "above". So Borobudur means dormitary, monastry or complex of temples on a hill. Another accepted theory is based on the inscriptions of Cri Kanahuluan (842 after Christ).

He states that the name Borobudur is derived from "Bhumisambharabhudhara" which means "The monasteries of the Accumulation of Virtue on the ten stages of the Budhisatwa".

Historical background

The exact date of the foundation of the Borobudur is still uncertain. Judging from its architecture and ornamentation in comparison with the other Buddhist temple of known age (700-950 after Christ); and considering certain inscriptions in the buried reliefs of the base and the fact that this monument belonged to the Vajrayana sect of the Tantric school which was active in Java around 700 after Christ, it may be concluded that the Borobudur was built ± 850 after Christ.

For a century and a half the Borobudur was the spiritual centre of Buddhism in Java. Since the decline of the Buddhist Kingdom of Central Java (about 950) and the increasing power of a new Buddhist Kingdom in East Java, the Borobudur had been allowed to fall into decay. Volcanic eruptions, and the destructive action of the vegetation ravaged the monument. Partly the monument collapsed, other parts were burried. Before its restoration, the Borobudur was covered with earth and forest and only a small part of it was visible.

In 1814 Sir Th. St. Raffles was gouverner of the country, and ordered H.C. Cornelius, a military engineer, to examine the ruins and to remove the earth and the vegetation which covered the monument. Since then, many efforts, were made to preserve it. The main restoration was carried out by Th. Van Erp in 1907-1911, who succeeded to prevent further decay of the Borobudur. Although many parts of the foundations and the walls of the three lower stages were slanting and sagging, Van Erp judged the damage not too serious. They lasted another 50 years. After 1960, yearly measurements of the slanting walls, made clear that measures had to be taken to avoid total collapse of the Borobudur.

Thorough investigations led to the conclusion that the main danger comes from the water, which erodes the hill inside the monument, weakens the foundations and enhance chemical processes which destroys the reliefs. This problem was dealt with by the complete rebuilding of the three lower stages on reinforced and properly drained foundations.

This restoration started in 1963 and is not yet completed. The restorations were financed by the Indonesian Government, and by the FAO and several foreign organizations.

Structure

During Buddhist times the Borobudur served as a sanctuary, a place of worship to Buddha and Sanggha ; and as a divine symbol of Buddhism.

The Borobudur has the form of a hemisphere. All its sections form a unity called a stupa.

The length of each side of the square base of the Borobudur is 120 meters, whilst the height from the temple is based till the summit is 31,5 metres (42 metres including the pinnacle).

According to Buddhist cosmology, the universe is divided into three major parts, called Kamadhatu, Rupadhatu and Arupadhatu respectively. This is reflected in the structure of the Borobudur, which is considered as a model of the universe.

- KAMADHATU is the "phenomenal world" for common people. The foot of the Borobudur represents this world.

- RUPADHATU is the transitional sphere where human beings are being released from wordly matters but are still tied to it. This sphere is represented by four rectangular storeys. These storeys or are called galleries and are surrounded by "balustrades". There, in a number of niches, are sitting Dyani or Meditative Buddha statues. Opposite to the

"ballustrades", the walls are decorated with reliefs despicting stories from Sanskrit manuskripts.

- ARUPADHATU is the highest sphere, the abode of the gods; the three circular terraces and the central domes ("dagobs") form the Arupadhatu. Before entering the Arupadhatu, a transitional region must be passed, which consists of a square plateau with a circular inner wall, which has no beginning and no end. The three circular terraces of the rest Arupadhatu have neither reliefs nor ornaments, and are adorned with 72 dagobs, arranged in three concentric circles of 32, 24 and 16 dagobs resp. surrounding the main stupa.

The main stupa, which is firmly closed, is bigger than the others and is situated in the centre as the crown on the monument. It is 9.90 metres in diameter and 7 metres high incl. its pinnacle. The pinnacle is said to have ended in three "umbrellas" which formed the uppermost part of the Borobudur.

Site - 15 : Central Java dance

In Central Java (surroundings of Jogjakarta, Solo and Semarang), there are many cultural activities, of wich dancing is well-known.

Java dances are called "wajang wong dances". They are divided in two forms, modern and classical, such as Ramayana Ballet, Klono Topeng, Gambjong and Beksan Lawung etc.

In 1961, an open air theatre was founded in front of the temple of Prambanan, to stage the classical drama of Ramayana.

It is known as the "Sendratari Ramayana" or the Ramayana Ballet, and features Javanese dances, modernised and blended with classical ballets. It is performed in June, July, August, September and October , on moonlight nights.

The Ramayana has been chosen to depict and restore of the heroic Prince Rama and serve as a media to maintain this romantic period of the Indonesian art and culture. The ballet, accompanied by "gamelan" orchestra and chorus, can easily be understood by foreigners.

The story is divided into six episodes :

1. The rape of Sinta
2. Adventures of the ape envoy
3. Resurrection and revenge
4. Invasion of the kingdom of Alengka
5. The story of a loyal warrier
6. Downfall and purification.

Site - 16 : Fertilizer Trials at Banguntapan Pijungan (Jogjakarta)

The Directorate of Technical Agriculture has started a "Soil Productivity Project" within the frame of PELITA (the Five Years Plan). The ultimate goal of the project is to gain experience and to issue recommendations which will increase the output of : (1) soils, (2) production materials, and (3) plants per unit area and time.

To achieve this goal the Directorate of Technical Agriculture centers its activities on : (1) fertilizer trials, (2) variety trials, (3) land utilization and (4) soil conservation.

In 1970/71 161 fertilizer trials were laid out. The 1971/1972 target is 277 units. One unit is located at Banguntapan, Pijungan, Jogjakarta to which the following information applies :

1. Purpose : to set basic fertilizer recommendations for wet rice under local conditions
2. Design : hexagonal with 3 replications
3. Treatment :

	N	P		N	P
A	0	30	F	180	30
B	45	0	G	90	30
C	45	60	H	90	30
D	135	0	J	90	30
E	135	60	K	90	30

Note : Nitrogen: kg N/ha Phosphate: kg P_2O_5/ha

4. Procedures :

- One replication is located at one desa; minimum distance between the replications is 1 km
- Rice variety : IR5
- Plot size : 3 x 10 m or 12 rows of 40 hills with 25 x 25 cm planting space

Site - 17 : Soil erosion problems, landuse and geology in the Baturagung range

The Baturagung range is the northernmost part of the Gunung Sewu region; it is separated from the plain by a steep escarpment. The difference in elevation between the plain and the top of the ridge ranges from 250 to 650 meters. The escarpment is subject to serious erosion. A number of rivers originate from the nearby Merapi volcano; they mix with other streams which run parallel to this escarpment. This causes strong lateral erosion which is enhanced by improper landuse. In places reforestation has been carried out both by the local population and by the Government c.q. the Forestry Service.

The Baturagung range includes "flysh" type sediments from the lower and middle Miocene. They consist chiefly of andesitic and dacitic conglomerates, tuffs, sandstones and shales. The layers can be seen along the road cut. The most upper layer consists of poorly stratified conglomerates.

The reddish soils developed on the conglomerates belong to the group of the Latosols. Data from a profile studied in Karangsari (Patuk) are given in Table 19.

Table - 19

Inst. number	: 158399/403
Location	: Karangsari Patuk, Wonosari, Central Java
Classification	: Red latosol (7th app.: Rhodudult)
Geomorphology	: Dissected ridges
Parent material	: Andesitic breccia and conglomerate
Elevation	: ± 200 m above sea level
Climate	: Type Aw, annual rainfall 1810 mm.
	Mean dry months: 14,3; Mean wet months: 6,8
Landuse	: Dry field (Cassava, maize, rice)

Description :

0 - 22 cm IA_1	: Dark reddish brown (2,5 YR $\frac{3}{4}$), clay weak fine crumb and subangular blacky, very friable, diffuse smooth boundary,
22 - 33 cm IA_3	: Dark reddish brown (2,5 YR $\frac{3}{4}$), clay weak fine and medium subangular blacky, very friable, diffuse smooth boundary,
33 - 65 cm IB_1	: Dark reddish brown (2,5 YR $\frac{3}{4}$), clay weak fine and medium subangular blocky and crumb, very friable, very faint cutans, gradual smooth boundary,
65 - 100 cm IB_2t	: Dark reddish (2,5 YR 3/6), clay, strong medium and coarse angular blocky friable, common cutans, clear smooth boundary,
100 cm + cm IIB_2t	: Red (2,5 YR 4/6), clay, strong medium angular blocky, firm, common cutans, stones and some weathering products.

Table - 19 Continued

Analytical data

Inst. No.	Depth (cm)	Texture			100 gr of fine earth 2 mm Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
158399	0 - 22	4	29	67	1,60	0,16	10	21	18	5,8	4,5
400	22 - 33	4	32	64	0,87	0,08	11	22	19	5,5	4,5
401	33 - 65	3	26	71	1,56	0,09	17	23	18	5,7	4,5
402	65 -100	5	30	65	0,77	0,07	11	22	18	5,6	4,4
403	100 +	2	28	70	0,06	0,06	13	22	10	5,5	4,4

Inst. No.	Total cation (S) m.e.	Adsorption capacity CEC(T) %	Base saturation (B) %	SiO_2 / Al_2O_3	SiO_2 / R_2O_3
158399	14,2	26,4	54	1,04	0,94
400	11,5	22,8	50	0,91	0,79
401	12,5	23,9	52	1,02	0,89
402	11,3	24,4	46	1,01	0,89
403	13,0	27,3	48	1,09	0,96

Mineralogical composition of the sand fraction

	Institute number				
	158399	158400	158401	158402	158403
Fraction	IV	IV	IV	IV	IV
Opaque	13	15	15	14	10
Quartz (turbid)	1	-	-	1	-
Quartz (trans.)	1	-	-	-	-
Iron concretion	12	13	12	20	12
SiO_2 (organic)	-	-	1	-	-
Zeolite	-	1	-	-	-
Hidrargilite	1	sp	sp	1	-
Miscellaneous	58	50	59	59	75
Rock fragments	5	12	6	4	2
Volcanic glass	2	1	1	2	-
Plagioclase (int.)	1	1	4	1	-
Plagioclase (bas.)	2	2	-	1	-
Hornblende (green)	1	-	sp	sp	1
Augite	2	3	1	sp	sp
Hypersthene	1	2	1	1	-

Site - 18 : Soil, landuse and geology in Wonosari area

The Wonosari area is situated on the "Southern Mountain region" (Daerah Gunung Kidul; Daerah = Region, Gunung = Mountain, Kidul = South). It comprises of the Baturagung range (Site-18a), the Wonosari basin (Site-18b), the Karst landscape (Site-18c) and a very small belt along the coast of beach sand (Site-18d). Most of the soils in this area are in a state of advanced deterioration due to improper landuse. The soils of these area are generally very low in agricultural value.

The greater part is used for dry field and mixed gardens. About 1/3 of the area is under forest again as a result of intensive reforestation in the recent years.

The dry field are intensively planted with food crops mainly in the wet season; while the mixed gardens are usually planted with tree crops. The crops intensity reaches almost 100% in this part.

Detailed description of each site of this area as follows :

Site - 18a : Rendzina in Bunder area

In the northern area along the Ojo river most of the soils are very shallow and contain lime - stone fragments and some pea irons. Generally only a thin soil is left above the hard and resistant limestone layers.

For the morphology and analytical data of this soil are Table - 20.

In this area the land is mostly occupied by secondary forest such as teak, mahoni, ecalyptus . The quality of the forest depends entirely on soil depth. Agriculture is only found where the soil are at least deep 20 cm.

Overwiekend op kalksteen - mergel
Zware, zwarte klei op geskeurde
kalksteen
Mahonie na Teakhout
Groei verslechterd Ook Pinus mechanisch
Het land is ook geterraseerd

Table - 20

Inst. number : 158404/406

Location : Bunder, Plajen (Wonosari)

Classification : Rendzina (7th app.: Para-Lithic Eutropeptic Rendoll) accord

Geomorphology : Limestone plateau

Parent material : Marly limestone (mixed with ash)

Elevation : ± 200 m above sea level

Climate : Type Aw, annual rainfall: 1810 mm; Mean dry months: 4.3; Mean wet months: 6.8

Landuse : Forest (Secondary forest) Mahonie + Teak + Pines

Description:

0 - 20 cm $A_{1.1}$ Very dark grey (10 YR 3/1), heavy clay, moderate fine and medium subangular blocky, friable, few limestone fragments, gradual smooth boundary,

20 - 40 cm $A_{1.2}$ Dark greyish brown (10 YR 4/2), heavy clay, moderate fine and medium angular blocky, friable, common limestone, fragments and weathered limestone, abrupt irregular boundary,

40 cm R Stratified marly limestone, with $A_{1.2}$ in void

Geen paralithic want de hande. Kalkbrok begint bij < 50 cm.
0-25 A_1
25-40 zachte kalkbrok (verweerd)
> 40 cm hard kalkbrok

Table - 20 Continued

Analytical data

Inst. No.	Depth (cm)	Texture			100 gr of fine earth < 2 mm Organic matter Extractable in HCl					pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
158404	0 - 20	3.5	7.3	89.2	5.64	0.40	12	25	11	7.2	6.7
405	20 - 40	0.6	10.2	89.2	2.66	0.31	9	20	9	7.7	6.8
406	40+	R o c k s									

Inst. No.	Total cation (S) m.e.	Adsorption capacity (T) %	Base saturation (B) %	SiO_2	
				Al_2O_3	R_2O_3
158404	59.5	71.2	84	1.66	1.39
405	64.6	66.4	97	1.25	1.15
406	R o c k s				

Mineral composition of the sand fraction

	Institute number		
	158404	158405	158406
Fraction	IV	IV	IV
Opaque	5	9	-
Quartz (turbid)	2	6	-
Quartz (transparent)	2	3	-
Iron concretion	1	1	-
SiO_2 (Organic)	-	-	-
Miscellaneous	2	5	-
Rocks fragments	13	10	-
Volcanic glass	sp	3	-
Plagioclase (int.)	54	40	-
Plagioclase (bas.)	9	6	-
Hornblende (green	sp	3	-
Augite	6	6	-
Hypersthene	6	7	-

Site - 18b : Grumusol and landuse in Wonosari Basin

The Wonosari basin is composed of slightly tilted strata of hard and pure limestones alternating with softer marly limestones. The area is gently undulating. On the slopes soils are shallow, with many outcrops of hard limestone. Water is the limiting factor. A Grumusol profile on the level land is shown in Table-21. Complete data from nearby profile are also presented (Table - 21a).

In this area there are many rainfed sawahs. In the wet monsoon upland rice, groundnuts or soybeans intercropped with maize or millet are cultivated, and in lower areas also tobacco is grown. Yields are low during the dry season the greater part of the land remains fallow, although the average crop intensity in this area is rather high (184, Table - 6).

Since a couple years the Madukismo sugar factory made orientations in this area with sugar cane nurseries. The Agricultural Extension Service has also a demonstration plot on dryfarming. This basin is agriculturally the most promising.

Table - 21

Inst. number	: 158407/409
Location	: Nagasari, Plajen (Wonosari)
Classification	: Dark Grey Grumusol (7th app.: Typic Pelludert)
Parent material	: Alluvial material mostly from limestone area (affected by ash fall)
Elevation	: ± 210 m above sea level
Climate	: Type Aw, annual rainfall 1810. Mean dry months: 4.3; Mean wet months: 6.8/year
Landuse	: Rainfall ricefield and dry field (upland rice, cassava, maize)

Description:

0 - 15 cm A_1	Very dark (10 YR 3/1), heavy clay, strong coarse, angular blocky, slightly sticky, faint slickenside, diffuse smooth boundary,
15 - 65 cm C_1	Very dark grey (N3), heavy clay, medium and coarse angular blocky, sticky and plastic (brittle) with brown spots along the cracks, prominent slickenside, gradual smooth boundary,
65 + cm C_2	Very dark grey (N3), heavy clay, strong medium and coarse angular blocky, sticky and plastic (brittle), common manganese and CaO_3 concretions, few limestone pebbles.

Prachtige vertisol
Zeer sterk gescheurd
Sterke kruimelige bovengrond

Table - 21 Continued

Analytical data

Inst. No.	Depth (cm)	Texture			100 gr of fine earth <2 mm Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	HCl
158407	0 - 15	4.0	19.6	76.4	1.42	0.14	10	16	10	7.8	7.0
408	15 - 65	5.3	5.4	89.3	1.43	0.14	10	10	7	7.7	6.7
409	65+	1.4	10.8	87.8	0.86	0.05	17	8	3	6.1	6.8

Inst. No.	Total cation (S) m.e.	Adsorption capacity (T) %	Base saturation (B) %	SiO_2 / Al_2O_3	SiO_2 / R_2O_3
158407	46.3	54.6	88	1.93	1.05
408	60.1	67.4	89	1.78	1.57
409	61.3	67.0	91	1.23	1.02

Mineralogical composition of the sand fraction

	Institute number		
	158407	158408	158409
Fraction	IV	IV	IV
Opaque	4	1	6
Quartz (turbid)	4	5	8
Quartz (transparant)	13	4	12
Iron concretion	29	27	23
Zeolite	1	sp	-
Miscellaneous	2	-	-
Rock fragments	3	5	-
Volcanic glass	-	sp	2
Plagioclase (int.)	19	45	38
Plagioclase (bas.)	11	2	3
Sanidin	-	-	sp
Hornblende (green)	6	8	3
Hornblende (brown)	sp	-	-
Augite	2	1	2
Hypersthene	6	2	3

Table 21b

Inst. number	: 160739/742
Location	: Plajen, Nonosari, Central Java
Classification	: Grumusol (7th app. : Pelludert)
Geomorphology	: Interhilly basin of the limestones region
Parent material	: Limestone
Elevation	: ± 200 m above sea level
Climate	: Type Aw annual rainfall 3403 mm Mean dry months: 2.8; mean wet months: 8.5
Landuse	: Dry field

Description:

0-16 cm	A_{11}	Very dark gray (10 YR 3/1), clay, strong very coarse subangular blocky to angular blocky, extremely hard, gradual smooth boundary,
16-36 cm	A_{12}	Very dark gray to dark gray (10 YR 3/1, 4/1), clay, strong medium subangular blocky, extremely firm, clear smooth boundary,
36-50/70cm	A_3	Gray to grayish brown (10 YR 5/1, 5/2), clay, moderate-medium subangular blocky, slightly - sticky, abrupt irrigular boundary,
50/70+ cm	R	Limestone

Site - 18c : Tropical karst landscape in Mulo area

The karst landscape visited belongs to the Gu - nung Sewu area (that is : Thousand hills); it is bordered to the north by the basins of Wonosari and Baturetno, which have a lower erosion level. These boundaries are flexures and the formation of the lower surfaces was apparently favoured by the down warping of these two depressions. To the south the Indonesian ocean has carved a steep cliff which sometimes cuts the hillocks in two.

It consists of hundreds of conical limestone mound with rounded tops. There are striking dolins, i.e. conical pits or sinks in the limestone. These pits have in the centre at the lowest point an outlet for rain water; this flows downward to subterranean passages and rivers. In some places water is ponded and developed into small lake or sink holes ("telaga"), where the people can get their domestic water. This landscape cover an area of about 1400 sq.km. It is called "Cockpit Karst" or "Cone Karst" and Flathe and Pfeiffer (1965) proposed the name of "Sinus Karst".

Water is the limiting factor in this area. Most of the water penetrates downwards and forms underground streams. This phenomenon is a direct result of karstic processes. A typical example is the one near Mulo area.

Table - 22

Inst. number	: 160053/055
Location	: Mula, Wonosari, Central Java
Classification	: Mediterranean (7th app.: Typic Tropudalf)
Geomorphology	: Karst Landscape
Parent material	: Limestones
Elevation	: 200 m above sea level
Climate	: Type Awa. Annual rainfall 3083 mm Mean dry months: 3,0; mean wet months: 8,2
Landuse	: Dry field (cassava, maize)

Description :

0 - 20 cm A_1	Dusky red (2,5 YR 3/2), heavy clay, moderate medium angular blocky, firm to friable, clear smooth boundary to,
10 - 40 cm $B_{2.t}$	Dark red (2,5 YR 3/6) heavy clay, strong medium angular blocky, firm, abrupt smooth boundary to,
40 + cm R	Limestones

Analytical data

Inst.No.	Depth (cm)	Texture			100 gr of fine earth < 2 mm Organic matter			Extractable in HCl		pH	
		Sand %	Silt %	Clay %	C g	N g	C/N	P_2O_5 mg	K_2O mg	H_2O	KCl
160053	0-10	3.6	19.9	76.5	2.51	0.21	12	18	13	8.3	7.1
054	10-40	1.1	18.4	80.5	1.45	0.16	9	17	56	8.0	7.0
055	40+	l	i	m	e	s	t	o	n	e	

Inst.No.	Total cation (S) m.e.	Adsorption capacity CEC (T) %	Base saturation (B) %	SiO_2 Al_2O_3	SiO_2 R_2O_3
160053	37.8	43.2	88	nd	nd
054	28.7	35.7	80	nd	nd
055	l i m e s t o n e				

nd = not determined

Mineral composition of the sand fraction

	Institute number		
	160053	160054	160055
Fraction	IV	IV	o
Opaque	10	47	
Quartz (turbid)	1	7	e
Quartz (transparent)	sp	5	
Iron concretion	7	13	o
Zeolite	sp	-	
Miscellauneous	-	1	t
Rock fragments	15	1	s
Volcanic glass	4	sp	
Plagioclase (int.)	15	5	o
Plagioclase (basic.)	25	5	
Hornblende (green)	8	10	e
Hornblende (brown)	-	1	
Augite	6	sp	-
Hipersthene	9	5	

The soils of the hills consist of Lithosol and Mediterranean soils, while Alluvial soils occupy the lower parts. Table - 22 gives an example of the morphology and laboratory features of Mediterranean soils.

This area is intensively, used for dry farming. Terracing by means of small stones will give an adequate protection to this particular soils and are commonly practiced by the local people. In the dry season most of the area is fallow. This period, especially from September to November is the most critical for both people and livestock. The adjacent Forests are usually wildly cut by the local people. The forest Services have introduced since ten years ago mullberry plantations for silk production and soil conservation as well. In the recent years reforestation has been intensively carried out by the local Forest Service, as it can be seen along the road from Wonosari to Baron.

Site - 18d : Beach formation and fresh water well in Baron

The dunes and sandbars are built up from sandy materials transported to the sea by a number of rivers and streams, such as Opak, Progo and Baron. This sand consists of feldspars, amphiboles, pyroxenes, quartz, iron and lime concretions as well as magnetite and titanium iron ore.

The current of the sea throws the sand up on the shore, parallel to the coast near the river mouths. This sand is blown towards inland by the wind. The sea breeze here is steady but only moderately strong; thus, only small amounts of sand are transported, but the vegetation, during to sufficient rain, can attend over the rapidly weathering sand of these dunes as quickly as they are formed. Coconuts are the main crops in this area.

In the wide alluvial plain, dunes are often found in successive ridges. In the western part of the Central Java coast the magnetic and titanium iron ore has been exploited by the Ministry of Mines c.i. PN Aneka Tambang.

In the karst landscape the surface of the land is dry, while the underground waters may reach enormous quantities amounts. The vauclusian spring at Baron is reported to have a minimum discharge during the dry season exceeding 400 litres per second.

Site - 19 : Farewell party

The post-conference tour will be closed officially by a farewell party. Tentatively this will be held at Garuda Hotel.

Definitive programme will be announced at Jogjakarta.

Site - 20 : Rubber Research Centre, Getas (Salatiga)

The RRC was founded on January 1, 1964 by the BPU-PPN Karet (General Supervising Agency of the Governmental Rubber Estates). It is a continuation of the Merbuh Research Centre, situated at Merbuh Estate. In December 1964, the Research Centre of Merbuh moved to a newly built Office complex in an area next to the Getas Rubber Estate and was renamed as the Rubber Research Centre (The R.R.C.) of Getas.

The research centre is financed by the BPU-PPN Karet. Its main concern is to support the Board of the Governmental Rubber Estates (PNP) in Central and East Java. In addition to management studies the development of the enterprises is strived at.

On August 28, 1968, a reorganization of the PPN took place. As a result the RRC was transferred to PNP's X, XI, XII, XIII, XVIII, XXII and XXVI, which are all rubber estates situated in South Sumatra, Lampung and on Java. Since that time the RRC has been financed by these seven PNPs. Its main task is the give support to the Board of these seven PNPs on management problems.

At present, the RRC is organized in three sections : (1) Planting technique, (2) Economy and (3) Soils and Climate. The section for planting technique is divided subsections for rubber, cocoa and kapok;

the sections for soils and climate is subdivided in subsections for Soil survey and field trials, climatology and laboratory analyses. There are 47 employees, of which eight Staff members holding University degrees, and one with a Bachelor degree.

The activities of the RRC include research on rubber agronomy, on cocoa and on kapok, conducted by the Planting Technique Section. Case studies, aiming at improvement of estate management, are carried out by the Section for Business Economy. Fertilizer trials on rubber, cocoa, coffee and kapok, and soil and climate surveys are carried out by the Soil and Climate Section.

Four different publications are issued, regularly, viz. the annual report, the research journal, the Bulletin of the RRC Getas, and the Estate Conference Report.

Site - 21 : Water Requirements Studies at Tambi, Rentang Irrigation Project, (West Java)

Water Requirement Studies by the Bogor Agricultural University started in 1969, at four places, viz. the Glapan Sdadi Irrigation Project(Central Java), the Rentang and Tangerang Irrigation Project (West Java) and the Way Seputih Irrigation Project (Sumatra). The study is sponsored by PROSIDA (Irrigation Rehabilitation Project of the International Development Association). In each irrigation project an agroclimatological station is set up to support water requirement studies.

The field experiments at Tambi, Rentang Irrigation Project, are conducted to investigates (1) the Consumptive Use of some varieties of lowland rice and other annual crops and (2) irrigation water requirement for each crop.

The 1972 experiment on lowland rice :

1. Purpose :-to investigate the water consumption and the irrigation water requirement of some rice varieties.
-to check the validity of some formula, presently used to estimate the consumptive use from climatological data.

2. Design : split-plot, 3 replication.

3. Treatments : combinations of 4 varieties and 3 fertilizer level.

The varieties (main plot factor) :

V_1 = IR_5 V_3 = Syntha

V_2 = C_4-63 V_4 = Candasari abang, local varieties

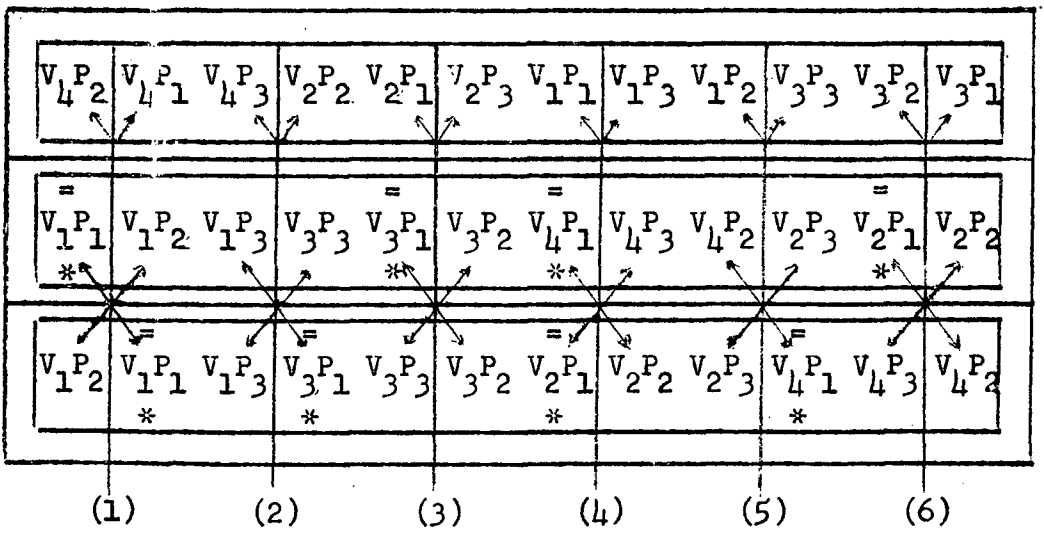
The fertilizer doses (subplot factor) :

P_1 = 200 kg urea + 100 kg TS, P_2 = 300 kg urea + 150 kg TS and P_3 = 400 kg urea + 200 kg TS.

4. Plot size :

Main plot : 5 x 6 sq.m and subplots 10 sq.m.

5. Lay out :



Legend : = open lysimeter (3) water tank reservoir

* closed lysimeter I,II,III replications.

The 1972 experiment on soybean :

1. Purpose : to investigate the water consumption of some soybean varieties and the irrigation water requirement during the plant growth.

2. Design : split-plot, 2 replication

3. Treatments: all combinations of 3 soybean varieties (main plot factor) and 5 level of water application (subplot factor).

   The varieties : K_1=Ringgit, K_2=Sumbing and K_3= line No. 27.

   Level of water application

   A_0 = no water gift
   A_1 = 1500 m^3/ha/90 days
   A_2 = 3000 m^3/ha/90 days
   A_3 = 4500 m^3/ha/90 days
   A_4 = 6000 m^3/ha/90 days

4. Plotsize : 5 x 6 sq.m.

5. Water losses are determined at 20 cm, 40 and 60 cm depth by gravimetric method.

6. Lay out :

I					II				
K_1A_3	K_1A_2	K_1A_1	K_1A_0	K_1A_4	K_2A_3	K_2A_0	K_2A_4	K_2A_1	K_2A_2
K_3A_1	K_3A_2	K_3A_4	K_3A_0	K_3A_3	K_1A_1	K_1A_3	K_1A_2	K_1A_4	K_1A_0
K_2A_2	K_2A_4	K_2A_3	K_2A_1	K_2A_0	K_3A_2	K_3A_1	K_3A_0	K_3A_3	K_3A_4

Table - 23

Inst. number	: -
Location	: Djatibarang, Tjirebon
Classification	: Grumusol (7th app.: Pelludert)
Geomorphology	: Alluvial plain
Parent material	: Alluvium
Elevation	: 20 m above sea level
Climate	: Type Aw; Annual rainfall 1827 mm. Mean dry months: 4,5; Mean wet months: 6,5
Landuse	: Irrigated rice field

Description :

0 - 10	I	Gray (10 YR 5/1), clay with many medium, distinct yellowish red (5 YR 5/8) mottles; moderate, medium subangular blocky structure; firm; clear and smooth boundary,
10 - 27	II	Dark gray (10 YR 4/1), clay with many medium, distinct yellowish red (5 YR 5/8) mottles; strong, very coarse subangular blocky structure; very firm; gradual and smooth boundary,
27 - 38	III	Dark gray (10 YR 4/1), clay with many coarse, distinct yellowish brown (10 YR 5/8) and black (10 YR 2/1) mottles; strong, very coarse subangular blocky structure; very firm; few manganese concretion; clear and smooth boundary,
38 - 84	IV	Gray (10 YR 5/1), clay with many medium, distinct yellowish brown (10 YR 5/8) mottles; massive to strong, very coarse subangular blocky structure; very firm; few manganese concretion; gradual and smooth boundary,
84 - 120	V	Light gray (10 YR 6/1), silty clay with many medium, distinct yellowish brown (10 YR 5/8) mottles; massive; firm;

Note: Analytical data not yet available.

MISCELLANEOUS

List of shops on handicraft, antiques

A. Djakarta

1. G.K.B.I. Batik Shop
   Djl. Djendral Sudirman no.28 Djakarta.
   Djl. Hadji Agus Salim no.39, Djakarta.

2. "Jayakarta" Center of crafts and arts
   Djl. K.H.A Wachid Hasjim 168, Djakarta.

3. "Exclusive Batiks"
   Djl. Imam Bondjol 80, Djakarta.
   Batik on silk and cotton and distinctive Indonesia jewellery.

4. "Taman Batik halus"
   Djl. K.H.Hashari, Djakarta. Java Batiks specially hand-mode, reasonable prices with special discount for tourist.

5. "Java Boutique,
   Djl. Semarang 14, Djakarta
   specially in batik, batik dresses, shirts.

B. Bandung

1. "Rubberwares" P.D.Karim
   Djl. Djakarta 12, Bandung

2. "Tatarah"
   Djl. Braga 51C, Bandung
   (paintings and gems)

3. "Surja Wisata"/"Susilo Wati"
   Djl. Raja Tjimindi 449, Bandung.
   Bamboo workshop.

4. "Agam"

Djl. Ir H.Djuanda 5, Bandung.

5. Pritico"

Djl. Braga 52, Bandung.

Special Batiks.

C. Jogjakarta

1. "Giri Kentjana" Batik Atelier

Djl. Mangkujudan 15A, Jogjakarta.

2. "Gendala Giri" Batik Arts House

Djl. H.O.S. Tjokroaminoto (Pakuntjen) 11A,
Jogjakarta

3. "Jogja" Art Gallery

Djl. Gampingan 42, Jogjakarta.

4. "Tjokrosoeharto"

Djl. Panembahan 58, Jogjakarta.

Arts and crafts.

5. "Terang Bulan"

Djl. Malioboro, Jogjakarta.

Batik arts house.

6. "Toko Java" Indonesian arts shop

Djl. Judonegaran 2,
Jogjakarta.

2. Most commonwords in Indonesian

English	Indonesia
Yes	Ja
No	Tidak
Please	Silahkan
Thank you	Terima kasih
No, thank you	Tidak
Ladies	Saudari2
Gentlemen	Saudara2
Where is/are .. ?	Dimana ?
When ?	Kapan ?
How much is/are .. ?	Berapakah ?
How far ?	Berapa djauhkan ?
What's this ?	Apakah ini ?
What do you want ?	Apakah jang anda perlukan ?
What must I do ?	Apa jang harus saja lakukan ?
May I have ... ?	Bolehkan saja .. ?
I want/should like	Saja suka
I don't want	Saja tidak suka
Here is/are	Ini ..
I like it/them	Saja menjukainja
I don't like it	Saja tidak menjukainja
I know	Saja tahu
I don't know	Saja tidak tahu
I didn't know	Saja tidak tahu
I think so	Saja kira demikian
I'm hungry	Saja lapar
I'm thirsty	Saja haus
I'm tired	Saja lelah

I'm in a hurry	Saja tergesa-gesa
Just a moment	Sebentar sadja
This way, please	Silahkan djalan ini
Take a seat (seat down please)	Silahkan duduk
Come in !	Masuklah !
It's cheap	(Ini) murah
It's too expensive	(Ini) terlalu mahal
You're right	Saudara betul
You'ar wrong	Saudara salah
I don't understand	Saja tak mengerti
Please speak slowly	Berbitjaralah pelan2
Sorry	Maaf
Excuse me	Maafkanlah
That's all right	Tidak apa2
Not at all	Tidak sama sekali
Don't worry	Djangan kuwatir
I beg your perdon	Saja minta maaf
Good/that's fine	Bagus/Itu baik
Good morning/good day	Selamat pagi/Selamat
Good afternoon	Selamat siang
Good evening	Selamat sore
Good night	Selamat malam
Hallo	Halo
How are you ?	Apa kabar
Very well, thank you	Baik sekali terima kasih
Good-bye	Selamat tinggal/djalan
See you soon	Sampai djumpa lagi
See you tomorrow	Sampai besok pagi
May I introduce you to	Bolehkan saja memperkenalkan Saudara

Keep right	Djalan kekanan
Information	Keterangan
Post office	Kantor pos
Exit	Keluar
Emergency exit	Pintu darurat
No smoking	Dilarang merokok
No admission	Tak diperkenankan
Is there an exchange bureau near here ?	Apakah ada kantor penukaran dekat sini ?
I want to change some pounds/dollars	Saja akan menukarkan beberapa pound/dollar
Do you give me some small change ?	Dapatkah anda memberikan uang ketjil
Sign here, please	Silahkan tanda tangan disini
Customs	Pabean
Passport control	Pemeriksaan paspor
I'm travelling alone	Saja bepergian sendirian
Which is your luggage ?	Mana barang anda
This is my luggage	Ini barang saja
Could shut my case now ?	Bolehkan saja tutup koperku sekarang ?
May I go ?	Bolehkan saja pergi
Where is the information bureau, please ?	Dimana bagian penerangan
Would you call a taxi ?	Apakah anda perlu taksi ?
Where's the nearest travel agency ?	Dimana agen perdjalanan jang terkenal
Arrivals	Datang
Booking Office	Kantor pendaftaran
Buses	Bus
Departures	Berangkat
Enquiries	Surat2 jang diperlukan

I'd like to book two seats on Monday's plane to	Saja daftarkan dua tempat untuk pesawat hari Senin djurusan ....
Thank you for a pleasant stay	Terima kasih banjak atas kebaikan hati
Waiter/Waitress	Bapak/Ibu
May I see the menu/the wine list, please ?	Bolehkan saja lihat menu/daftar anggur ?
Would you like to try ?	Apakah anda mau mentjoba ?
Is it hot or cold ?	Apakah ini panas atau dingin?
Some more bread, please	Minta roti lagi
What will you have to drink?	Mau minum apakah anda ?
Two more beers	Dua botol bir lagi
I'd like another glass of water, please	Saja minta segelas air lagi
Three black coffees and one with cream	Tiga kopi tubruk dan satu kopi cream
Could I have a light,please?	Dapatkah saja minta api
Breakfast	Makan pagi
A large whitecoffee, please	Satu kopi susu
A black coffee	Satu kopi tanpa gula
A cup of tea, please	Satu tjangkir teh
I'd like tea with milk/lemon	Saja suka teh dengan susu/djeruk
May we have some sugar, please ?	Tjoba minta gulanja
Have you some jam/marmalade?	Apakah ada jam/mermalade ?
I would like a hardboilde egg/sofft-boiled egg	Saja minta telur rebus/setengah rebus
What fruitjuices have you?	Djus apa sadja jang ada ?
Have you another one	Apakah masih ada jang lain
I want a quite room	Saja ingin kamar jang sepi

How much is the room per night?	Berapa sewanja semalam?
Are service and tax included?	Apakah servis dan padjak sudah termasuk dalam sewanja?
Is breakfast included in the price?	Apakah makan pagi sudah termasuk dalam harga?
Could we have breakfast in our room, please?	Dapatkah makanan pagi diantar kekamar?
There's no ashtray in my room	Tak ada asbak dikamar saja
Is three a point for a electric razor?	Apakah ada kontakan untuk pisau tjukur listrik?
What's the voltage?	Berapakah voltasenja?
Where is the bathroom/ the lavatory?	Dimana kamar mandi/kamar ketjil?
Is there a shower?	Apakah ada?
There are no towels in my room	Tak ada handuk dikamar saja
There's no water	Tak ada air
There's no toilet paper in the lavatory	Tak ada kertas toilet dikamar ketjil
May I have another blanker/ another pillow?	Saja minta selimut dan bantal lagi
These sheets are dirty	Spreinja kotor
I can't open my window please open it	Saja tak dapat membuka djendela tolong bukakan
Come in	Masuklah
Put it on the table, please	Tolong taruh ini dimedja
Glad to know you	Sangat senang dapat berkenalan dengan saudara
What's your name	Siapa namamu

What's your address?	Bagaimana alat saudara
Would you like a drink?	Apakah anda ingin minum
Do you smoke?	Apakah anda merokok
Can I offer you anything?	Dapatkah saja memesankan sesuatu untuk anda
Bon voyage	Selamat djalan
Good luck/all the best	Selamat berpisah/baiklah
Not for drinking	Bukan untuk diminum
Open	Buka
Caution	Perhatian/Hati2
Bank	Bank
Knock	Ketuk
Cashier	Kas
Closed	Tutup
No entry	Dilarang masuk
Entrance	Pintu masuk
Lavatory/toilet	Tilet/kamar ketjil
Ladies	Wanita
Gentlemen	Pria
Guide	Petundjuk
Admission free	Diperbolehkan
Vacant/free/unoccupied	Kosong
Engaged/occupied	Telah diisi/ditempati
Danger	Berbahaja
Police station	Kantor polisi
Reserved	Dipesan
Do not touch	Djangan disentuh
Ring	Berbunji

Is there a flight to .... next Thursday?	Apakah ada pesawat ke .. hari Kamis jang akan datang?
When does it leave/arrive?	Kapan berangkat/datang?
When does the next plane leave?	Kapan pesawat berikutnja berangkat?
Is there a coach to the airport?	Apakah ada bus kelapangan udara?
When must I check in?	Kapan saja harus mengetjek?
Please cancel my reservation to	Saja menunda keberangkatan ke .....
I'd like to change my reservation to	Saja ingin ganti memesan kedjurusan .....
Where's the bus station?	Dimanakah terminal bus?
What stops does it make?	Dimana sadja berhentinja?
Is it a long journey?	Apakah perdjalanan ini lama?
We want to take a sightseeing tour round the city	Saja ingin melantjong dikota
Is there an excursion to .... tomorrow?	Apakah besok ada ekskursi ke .....?
What time is the next bus?	Bus berikutnja djam berapa?
Does this bus go to the station?	Apakah bus ini menudju kestasion?
Does it go near .....?	Apakah dekat ke .....?
I want to go to	Saja ingin pergi ke ....
Are you free?	Apakah anda ada waktu?
Please take me to Hotel Transaera/the station/ this address	Bawalah saja ke Hotel Transaera/stasion/ alamat ini

Could you hurry, I'm late	Apakah dapat dipertjepat, saja terlambat
Would you clean this dress, please?	Tolong bersihkan badju ini
Would you press this suit, please	Tolong setrika/litjin pakaian setelan ini
When will it be ready?	Kapan itu bisa selesai?
It will be ready tomorrow	Itu akan selesai besok
My key, please	Maaf, betulkah kuntji saja
Are there any messages for me?	Apakah ada kabar untuk saja?
There's lady/gentleman to see you	Ada wanita/pria untuk anda
Please ask her/him to come up	Tjoba dia suruh datang kemari
Have you any writing paper/ envelopes/stamps?	Apakah anda punja kertas surat/amplop/perangko?
I need a guide/an interpreter	Saja memerlukan seorang petundjuk/penterdjemah
Where is the dining room?	Dimana kamar makan?
What time is breakfast/ lunch/dinner?	Djam berapa makan pagi/ makan siang/makan malam
Is the hotel open all night?	Apakah hotel buka semalam suntuk?
What time does it close?	Djam berapa tutupnja?
I have to leave tomorrow	Saja akan berangkat besok
Can you have my bill ready?	Apakah anda dapat menjelesaikan kwitansinja?
Could you have my luggage brought down?	Dapatkah anda membawakan barang saja kebawah?
Please wait a minute	Silahkan tunggu sebentar
Stop here	Berhenti disini

Is it far?	Djauhkah?
How much do you charge by the hour/for the day?	Berapa ongkos perdjdanan sehari?
How much is it?	Berapakah ini?
That's too much	Itu terlalu mahal
Where is .....?	Dimana .....?
Is this the way to ....?	Apakah ini djalan ke ...?
How far is it to .....?	Berapa djauhkah ke ....?
How many kilometers?	Berapa kilometer?
Where are we now?	Dimana kita sekarang?
Please show me on the map	Tundjukkanlah padaku di peta
It's that way	Ambillah djalan ini
Keep straight on	Terus lurus
Have you a room for the night?	Apakah ada kamar untuk malam ini?
I've reserved a room, may name is	Saja telah pesan kamar, nama saja .....
Do you know another hotel?	Apakah anda mengetahui hotel jang lain?
I want a single room with a shower	Saja ingin satu kamar dengan douche
We want a room with a double bed and a bathroom	Saja ingin sebuah kamar dengan dua tempat tidur dan sebuah kamar mandi
Have you a room with twin beds?	Apakah ada kamar dengan tempat ridur dua orang?
May I see the room?	Bolehkah saja melihat-lihat kamarnja?
I like this room, I'll take it	Saja suka kamar ini, saja akan pesan

3. Participants of the Post-Conference Tour

	Total Member	Research / Institutes Agencies	Universities
I. ASEAN Countries			
1. Indonesia	38	28	10
2. Malaysia	26 *)	26 *)	-
3. The Philippines	5	5	-
4. Thailand	8	8	-
5. Singapore	-	-	-
	77	67	10
II. OTHER AGENCIES			
1. FAO in the resp. Asean countries			
- Indonesia	2	2	-
- Thailand	4 *)	4 *)	-
2. Bilateral Technical assistance			
- Belgium	1	1	-
- The Netherlands	1	1	-
3. I R R I	1	1	-
III. INVITED SCIENTISTS			
1. Australia	3	1	2
2. Belgium	6 *)	-	6 *)
3. Japan	-	-	-
4. The Netherlands	2	-	2
5. FAO, ROME	1	1	-
	21 *)	11	10 *)
	98 *)	78	20

*) Included their wifes

I.1. INDONESIA

No.	Name	Address
1.	Dr D. Muljadi	Soil Research Institute Djl. Ir H. Djuanda 98, Bogor
2.	Prof. Dr A.M. Satari	Bogor Agricultural University Djl. Otto Iskandardinata Bogor
3.	Dr O. Koswara	ditto
4.	Dr F. Rumawas	ditto
5.	Dr S. Arsjad	ditto
6.	Mr M.Soeprapto-hardjo	Soil Research Institute Djl. Ir H. Djuanda 98 Bogor
7.	Mr M. Sudjadi	ditto
8.	Mr Junus Dai	ditto
9.	Mr M. Sukardi	ditto
10.	Mr I.P. Gedjer Widjaja Adhi	ditto
11.	Mrs Sri A.Sujitno	ditto
12.	Mr Subagjo	ditto
13.	Mr A. Suroto	ditto
14.	Dr Rusli Hakim	Central Research Institute for Agriculture Djl. Merdeka 99, Bogor

INDONESIA (cont'd)

No.	Name	Address
15.	Mr M.M. Purbo Hadiwidjojo	Geological Survey Djl. Diponegoro 24, Bandung
16.	Mr R.M. Tedjojoewono Notohadiprawiro	Gadjah Mada University Bulak Sumur Jogjakarta
17.	Mr L.J. Soepangat	Institute for Agricultural Research and Education P.O.Box 318 Manokwari (West Irian)
18.	Mr Imam Muhali	Institute for Plantation Education Djl. Sala 40a Jogjakarta
19.	Mr Wibisono	Rubber Research Centre c/o PNP II Tandjung Morawa Medan (North Sumatra)
20.	Mr M. Isa Darmawidjaja	Rubber Research Centre C. Cas, Salatiga
21.	Dr T.S. Dharmaputra	Brawidjaja University Djl. Gading 2A Malang
22.	Mr Soepartono	Bimas Pasar Minggu, Djakarta
23.	Mr Hadijono	Directorate Soil Productivity Pasar Minggu, Djakarta
24.	Mr Goei Ging Bien	ditto

INDONESIA (cont'd)

No.	Name	Address
25.	Dr M.J. Chambers	Bogor Agricultural University Djl. Otto Iskandardinata Bogor
26.	Mr Subadio Susetyo	ditto
27.	Mr Abdul Muin Lubis	University of North Sumatra Djl. Tjik Ditiro 28 Medan (North Sumatra)
28.	Mr Surjono	Forest Research Institute Djl. Gunung Batu Bogor
29.	Mr Ismangun	Soil Research Institute Djl. Ir H. Djuanda 98 Bogor
30.	Mr Sukirno D.	ditto
31.	Mr Husein D.K.	ditto
32.	Mr Santun	Bogor Agricultural University Djl. Otto Iskandardinata Bogor
33.	Mr D. Djaenuddin	Soil Research Institute Djl. Ir H. Djuanda 98 Bogor
34.	Mr E. Soeparma	ditto
35.	Mrs Tini Prihatini Jusup	ditto

INDONESIA (cont'd)

No.	Name	Address
36.	Mr Gunadi	Soil Research Institute Djl. Ir H. Djuanda 98 Bogor
37.	Mr Dimjati Hasjim	ditto
38.	Mr O. Tasmo	ditto

I.2. MALAYSIA

No.	Name	Address
1.	Mr Hew Choy Kean	Harrison & Crosfield Oil Palm Research Station Banting Selangor
2.	Mr Jan M. Scott	Dept. of Agriculture Kuching Serawak, East Malaysia
3.	Dr K.T. Joseph	Dept. of Agriculture Kuala Lumpur West Malaysia
4.	Mr Khoo Boon Lian	ditto
5.	Mr Law Wei Min	Ministry of Agriculture and Fisheries Kuala Lumpur
6.	Mr I.F.T. Wong	Ministry of Agriculture Cooperations Kuala Lumpur
7.	Mr K. Kanapathy	Ministry of Agriculture Kuala Lumpur
8.	Mr K. Sivanadyan	Rubber Research Institute of Malaysia P.O.Box 150 Kuala Lumpur
9.	Mr Tan Keh Huat	ditto
10.	Mr Lau Chee Heng	ditto
11.	Mr Chan Heun Yin	ditto

MALAYSIA (cont'd)

No.	Name	Address
12.	Mr Khoo Kay Thye	Highlands Estate P.O. Box 203 Klang Selangor Malaysia
13.	Mr Maene L.M.T.	Fac. of Agriculture Univ. of Malaysia Kuala Lumpur Malaysia
14.	Mrs Jo Maene	Fac. of Agriculture Univ. of Malaysia Kuala Lumpur Malaysia
15.	Mrs Hew Choy Kean	Harrison & Crosfield Oil Palm Research Station Banting Selangor Malaysia
16.	Mr Kho Khee Ming	Since Darbu Plantation BHD Univ. Seafield Estate Batu Tiga, Malaysia
17.	Dr M.M. Singh	Rubber Research Institute of Malaya P.O. Box 150 Kuala Lumpur, Malaysia
18.	Mr Jeow Keng Hoe	Chemara Research Station Seremban, Malaysia
19.	Mr Francis Liew Kee Yong	Dept. of Agriculture Kota Kini Balu Sabah, East Malaysia
20.	Mr Kong Hen Yen	ditto

MALAYSIA (cont'd)

No.	Name	Address
21.	Mr Aripen bin Ampong	Dept. of Agriculture Kota Kini Balu Sabah, East Malaysia
22.	Mr Peter Thomas	ditto
23.	Mr Lim Chin Pang	Dept. of Agriculture Serawak
24.	Mrs Lim Chin Pang	ditto
25.	Mr Teoh Cheng Hai	Prang Besar Rubber Research Station Kajang, Selangor, Malaysia
26.	Mr Julaihi bin Ismail	Dept. of Agriculture Serawak, Malaysia

I.3. THE PHILIPPINES

No.	Name	Address
1.	Mr Francisco G. Salazar	Bureau of Soil P.O. Box 1848 Manila, Philippines
2.	Mr Bonafacio C. Felizardo	Dept. of Soil UPCA College Laguna, Philippines
3.	Mrs Lydia C. Francisco	Bureau of Soil M.Y. Orosa St. Ermita Manila, Philippines
4.	Mr Ignacio R. Ang	Bureau of Soil P.O. Box 1848 Maanila, Philippines
5.	Mr Isaac N. Nuestro	ditto

I.4. THAILAND

No.	Name	Address
1.	Mr Thamrong Charasaiya	Land Classification Land Development Dept. Bangkhen, Bangkok 9, Thailand
2.	Mr Prinya Sukhasem	Div. of Agriculture Chem. Dept. of Agric. Bangkok, Thailand
3.	Mr Samarn Panichapong	Soil Survey Division Dept. of Land Development Bangkhen, Bangkok 9 Thailand
4.	Mrs Nualsri Kanchanakool	ditto
5.	Mr Chaleo Changprai	ditto
6.	Mr Aroon Ingsujinda	Technical Division, Rice Dept. Ministry of Agric. Bangkok, Thailand
7.	Mrs Kannica Yoothong	Soil Survey Laboratory Soil Survey Division Dept. of Land Development Bangkhen, Bangkok 9 Thailand
8.	Miss Nitayaporn Thunyaudom	ditto

II.1. FAO - Indonesia

No.	Name	Address
1.	Mr D.C. Schwaar	Soil Research Institute Djl. Ir H. Djuanda 98 Bogor, Indonesia
2.	Mr P.L.J. de Jongh	ditto

II.2. FAO - Thailand

1.	Mr Forrest Steel	FAO Regional Office for Asia and the Far East, Maliwan Mansion Phra Atit Road, Bangkok, Thailand
2.	Mr Adriaan L.J. Van den Eelaart	ditto
3.	Mrs Tjadina Van den Eelaart	ditto
4.	Mr H.L. Slothouwer	ditto

II.2. Belgium

1.	Mr L.J. Lenvain	Soil Research Institute Djl. Ir H. Djuanda 98 Bogor, Indonesia

II.2. The Netherlands

1.	Dr P.M. Driessen	Soil Research Institute Djl. Ir H. Djuanda 98 Bogor, Indonesia

II.3. I R R I

No.	Name	Address
1.	Dr Tomio Yoshida	The International Rice Research Institute Manila, Philippines

III.1. AUSTRALIA

1.	Prof. J.P. Quirk	Institute of Agriculture Univ. of Western Australia Nedlands W.A. 6009, Australia
2.	Mrs J.P. Quirk	ditto
3.	Dr J.B. Colwell	SCIRO Div. of Soil P.O. Box 639 Canberra City A.C.T. 2061 Australia

III.2. BELGIUM

1.	Prof. Dr M.F. de Boodt	Fakulteit Van De Landbouw Wetenschappen 9000 Ghent Coupure Links 235, Belgie
2.	Prof. Dr J.D. D'Hoore	Katholieke Universiteit Leuven, Fakulteit Der Landbouw Wetenschappen de eroylean 423070 HEVERIEF 235, Belgie

III.2. BELGIUM (cont'd)

No.	Name	Address
3.	Prof. Dr N.Schamp Niceas	State University of Ghent Coupure Links 533, B-9000 Ghent, Belgium
4.	Mrs N. Schamp Niceas	ditto
5.	Prof. L.O.J. De Wilde	State University of Ghent Belgium 9001 Ghent
6.	Mrs L.O.J.De Wilde	ditto

III.4. THE NETHERLANDS

1.	Prof. Dr L.J.Pons	Agric. University Wageningen
2.	Prof. Dr J.Bennema	ditto

III.5. FAO Headquarter
Rome

1.	Dr R. Dudal	FAO Via Delle Terme di Caracalla 00100 Rome, Italy

4. List of Officers during the Post-Conference Tour

No.	N a m e	T a s k
1.	Dr D.Muljadi	Supervisor
2.	Prof. Dr A.Satari	Deputy Supervisor
3.	Mr M.Soepraptohardjo	Fieldtrip Manager
4.	Mr M.Sukardi	Field Programme Officer
5.	Dr O.Koswara	Field Manager
6.	Dr S.Arsjad	Field Manager
7.	Dr F.Rumawas	Field Manager
8.	Mr M.Sudjadi	Field Manager
9.	Dr Rusli Hakim	Technical officer
10.	Mr M.M.Purbo Hadiwidjojo	Technical officer
11.	Mr R.M.Tedjojuwono Notohadiprawito	Technical officer
12.	Dr P.M.Driessen	Technical officer
13.	Mr D.C.Schwaar	Technical officer
14.	Mr L.J.Lenvain	Technical officer
15.	Mr I.P.Gedjer Widjaja-Adhi	Recording officer
16.	Mr Soebagjo	Recording officer
17.	Mr S.Sukmana	Recording officer
18.	Mr A.Suroto	Recording officer
19.	Mr P.L.J.de Jongh	Recording officer
20.	Mr Junus Dai	Field Liaison Officer
21.	Mr Ismangun	Accomodation/Logistics
22.	Mr Dimjati Hasjim	Transportation/Communication
23.	Mr Husein D.K.	Entertainment/Sight-seeing
24.	Mr Santun	ditto
25.	Mrs Sri A.Sujitno	Treasurer and guide to the ladies programme

No.	N a m e	T a s k
26.	Mrs Tini P.Jusup	Guid to ladies programme
27.	Mr J.Djaenuddin	Technical assistant
28.	Mr E.Suparma	ditto
29.	Mr Gunadi	Documentation
30.	Mr Sutisna	Medical assistant

Advanced Group

1.	Mr Sukirno D.	Technical Officer
2.	Mr U.Tasmo	Technical assistant

Mechanics & drivers

1.	Mr Nawas	Mechanics
2.	Mr Sjahrinuddin	Driver/Mechanics
3.	Mr Hud Abud	ditto
4.	Mr Suhandi	ditto
5.	Mr Saimu	ditto
6.	Mr Sutisna	ditto
7.	Mr Basri	ditto
8.	Mr Agus	ditto
9.	Mr Suprijatna	ditto

REFERENCES

Bibliotheca Bogoriensis, 1948. Buitenzorg Scientific Centre, Archipel Druk. Boekhuis, Buitenzorg (Bogor).

DAMES, T.W.G., 1955: The soils of East Central Java; Contr. of Gen. Agric. Res. Sta. No.141, Bogor.

Depart. of Information, Republic of Indonesia: Short Guide to Borobudur, Mendut & Pawon. Pertj. Negara, Djakarta.

DUDAL, R. & M.SOEPRAPTOHARDJO, 1957: Soil classification in Indonesia. Contr. of Gen. Agric. Res. Sta., No.148, Bogor.

DUDAL, R., 1968: Definition of soil units for the soil map of the world. World Soil Resources Report, No.33, FAO, Rome (and supplement 1970).

DUDAL, R. & F.R. MOORMAN, 1965: Major soils of South East Asia. J. of Trop. Geogr. 18.

ESCHER, B.G., 1925: L'eboulement prehistorique de Tasikmalaja et le volcan Galoenggoung (Java), Leid.Geol.Meded., v.1.

FLATHE, H. & D. PFEIFFER, 1965: Grundzüge der Morphologie, Geologie und Hydrogeologie im Karstgebiet Gunung Sewu/Java (Indonesian): Geol. Jahrb., v.83.

Lembaga Penelitian Tanah, 1971: Naskah peta tanah eksplorasi Djawa/ Madura, Bogor.

Lembaga Penelitian Tanah, 1970-1972: Unplublished Reports. Bogor.

MEMET ARDIWILAGA, R.: Guide to West Java. BAPARDA Djawa Barat, Bandung.

MOHR, E.C.J., 1948: Soil of Equatorial regions (Translated from Dutch by R.L. Pendleton). Michigan.

NEUMANN VAN PADANG, M., 1951: Catalogue of the Active Volcanoes of the World Including Solfatara Fields. Pt.I: Indonesia; Internat'l Volcanol. Assoc., Napoli.

PARDYANTO, L., 1970: The Geology of the Dieng Area, Central Java. Geol. Survey Indon. Rept., mimeogr.

PITONO, R., 1971: The Dieng plateau. Hemisphere. v.15, no.12, Canberra.

PURBO HADIWIDJOJO, M.M., 1966: The Mineral Springs of Java, Indonesia. 11th Pacific Sci.Congr., Tokyo, August-Sept. 1966 (Abstr.); Dept. Geol.Inst.Tech.Contr. no.67, 1968. Bandung.

RAMLIE, P. & T.T. NANY, 1972: Indonesian Soil Bibliography 1940-1970. Bibliotheca Bogoriensis. Bogor.

SASTRAPRADJA, D.S., 1967: Berita Mipi, v.11, no.3-4. MIPI, Djakarta.

SCHMIDT, F.H. & J.H.A. FERGUSON, 1951: Rainfall types based on wet and dry period ratios for Indonesia with Western New Guinea. Djaw.Met. & Geof. Verh. no.42. Djakarta.

SOEPRAPTOHARDJO, M., 1961: Tanah Merah di Indonesia. Contr.of Gen. Agric.Res.Sta. no.161. Bogor.

SOEPRAPTOHARDJO, M. et al, 1972: Katalogus peta2 tanah dan lain2. Lembaga Penelitian Tanah. Bogor.

SOIL SURVEY STAFF, 1960: New Comprehensive system of soil classification. The 7th Approximation and Supplement (1967). USDA Soil Conservation Service, Washington.

Van BEMMELEN, R.W., 1936: Toelichting bij Blad 36 (Bandoeng), Geologische Kaart van Java, 1 : 100.000. Dienst van den Mijnb. Bandung.

Van BEMMELEN, R.W., 1943: Bull. East Indian Volcan. Survey for the Year 1941. Bandung.

Van BEMMELEN, R.W., 1949: The Geology of Indonesia, v.I, Govern. Printing Office, The Hague.

VOUTE, C., 1968: The Safegurading of Borobudur (Indonesia); Conf. on the weathering Stones, Internat'l Counc. Monuments and Sites. Brussels.

WALEAH, R.P.: Guide to Indonesia. C.V. Wales, Bandung.

ZEN, M.T., 1971: Geologic reconnaissance map of the Dieng-Batur Volcanic Complex. Seminar Penggunaan Aerial Survey dalam Projek2 Pembangunan, DPUTL, Djakarta.

Appendix III: Crop intensity.

Table 1.1. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN BOGOR

	Sawah		Dry field		Average Yield (q/ha)
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	
1. Rice	840	107	53	6	a)26,9 b)12,7
2. Maize	6	1	12	1	7,1
3. Soybean	0	0	-	-	4,9
4. Peanut	30	4	19	2	7,1
5. Cassava	24	3	78	9	100,3
6. Sweetpotato	65	8	27	3	67,1
7. Tobacco	0	0	-	-	-
8. Other crops	0	0	0	0	-
Total use	965	123	189	21	
A r e a	788	100	835	100	

Table 1.2. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN TJIANDJUR

	Sawah		Dry field		Average Yield (q/ha)
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	
1. Rice	585	115	85	9	a)29,1 b)10,2
2. Maize	1	0	24	3	7,2
3. Soybean	3	1	1	0	4,8
4. Peanut	2	0	15	2	6,7
5. Cassava	0	0	36	4	91,2
6. Sweetpotato	4	1	10	1	67,7
7. Tobacco	3	1	4	0	-
8. Other crops	-	-	-	-	-
Total use	598	118	175	19	
A r e a	510	100	910	100	

Note : a) Average yield of lowland rice
b) Average yield of upland rice

Table 1.3. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN SUKABUMI

	Sawah		Dry field		Average Yield (q/ha)
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	
1. Rice	532	125	112	11	a)27,9 b)11,7
2. Maize	2	1	34	3	6,6
3. Soybean	4	1	1	0	4,8
4. Peanut	2	0	23	2	5,6
5. Cassava	2	0	77	8	100,3
6. Sweetpotato	4	1	14	1	50,0
7. Tobacco	1	0	3	0	
8. Other crops	-	-	0	0	
Total use	546	128	265	27	
A r e a	426	100	1020	100	

Table 2. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN BANDUNG

	Sawah		Dry field		Average Yield (q/ha)
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	
1. Rice	1019	131	32	3	a)35,5 b)15,7
2. Maize	2	0	48	5	14,8
3. Soybean	0	0	2	0	8,6
4. Peanut	5	1	21	2	7,6
5. Cassava	1	0	106	10	72,6
6. Sweetpotato	11	1	42	4	59,9
7. Tobacco	0	0	12	1	
8. Other crops	0	0	0	0	
Total use	1038	134	263	25	
A r e a	773	100	1008	100	

Table 3.1. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN GARUT

	Sawah acreage (100 ha)	Sawah acreage (%)	Dry field acreage (100 ha)	Dry field acreage (%)	Average Yield (q/ha)
1. Rice	646	151	40	4	a)27,4 b)14,1
2. Maize	1	0	71	7	14,5
3. Soybean	4	1	36	4	6,1
4. Peanut	1	0	22	2	7,4
5. Cassava	0	0	93	9	75,6
6. Sweetpotato	4	1	28	3	53,1
7. Tobacco	3	1	39	4	
8. Other crops					
Total use	659	154	329	33	
A r e a	429	100	991	100	

Table 3.2. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN TASIKMALAJA

	Sawah acreage (100 ha)	Sawah acreage (%)	Dry field acreage (100 ha)	Dry field acreage (%)	Average Yield (q/ha)
1. Rice	808	170	52	4	a)25,8 b)12,1
2. Maize	1	0	30	2	8,9
3. Soybean	1	0	0	0	10,1
4. Peanut	3	1	19	1	5,4
5. Cassava	3	1	219	17	78,4
6. Sweetpotato	7	1	48	4	40,4
7. Tobacco	0	0	0	0	
8. Other crops	-	-	0	0	
Total use	823	173	368	28	
A r e a	476	100	1266	100	

Table 4.1. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN BANJUMAS

	Sawah		Dry field		Average Yield
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	(q/ha)
1. Rice	603	157	17	3	a)24,2 b)14,2
2. Maize	20	5	16	3	15,5
3. Soybean	27	7	11	2	7,6
4. Peanut	11	3	8	1	5,3
5. Cassava	7	2	60	9	59,9
6. Sweetpotato	3	1	6	1	50,6
7. Tobacco	3	1	0	0	
8. Other crops	-	-	-	-	
Total use	674	176	118	19	
A r e a	385	100	629	100	

Table 4.2. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN PURBALINGGA

	Sawah		Dry field		Average Yield
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	(q/ha)
1. Rice	300	131	5	1	a)23,1 b)18,8
2. Maize	58	25	99	26	13,3
3. Soybean	10	5	1	0	7,9
4. Peanut	23	10	9	2	4,9
5. Cassava	7	3	54	14	85,7
6. Sweetpotato	5	2	17	5	44,9
7. Tobacco	2	1	24	1	
8. Other crops	-	-	-	-	
Total use	405	177	188	49	
A r e a	229	100	375	100	

Table 4.3. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN BANDJARNEGARA

	Sawah		Dry field		Average Yield
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	(q/ha)
1. Rice	217	106	2	0	a)23,4 b)12,4
2. Maize	64	31	320	49	14,5
3. Soybean	11	5	0	0	7,1
4. Peanut	11	5	5	1	82,5
5. Cassava	7	3	69	11	82,5
6. Sweetpotato	3	1	21	3	38,3
7. Tobacco	0	0	48	7	
8. Other crops	0	0	-	-	
Total use	313	151	465	71	
A r e a	204	100	655	100	

Table 4.4. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN WONOSOBO

	Sawah		Dry field		Average Yield
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	(q/ha)
1. Rice	191	84	1	0	a)27,9 b)14,6
2. Maize	64	28	196	36	12,8
3. Soybean	4	2	0	0	8,5
4. Peanut	1	0	0	0	7,7
5. Cassava	12	5	88	16	52,6
6. Sweetpotato	8	4	13	2	55,1
7. Tobacco	2	1	44	8	
8. Other crops	-	-	-	-	
Total use	282	124	342	62	
A r e a	227	100	542	100	

Table 5.1. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN MAGELANG

	Sawah acreage (100 ha)	Sawah acreage (%)	Dry field acreage (100 ha)	Dry field acreage (%)	Average Yield (q/ha)
1. Rice	439	103	1	0	a)25,5 b) 7,2
2. Maize	50	12	140	26	14,3
3. Soybean	2	0	0	0	8,8
4. Peanut	10	2	6	1	8,4
5. Cassava	15	3	74	14	117,8
6. Sweetpotato	13	3	6	1	67,8
7. Tobacco	37	9	18	3	
8. Other crops	-	-	-	-	
Total use	565	132	245	45	
A r e a	426	100	545	100	

Table 5.2. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN SLEMAN

	Sawah acreage (100 ha)	Sawah acreage (%)	Dry field acreage (100 ha)	Dry field acreage (%)	Average Yield (q/ha)
1. Rice	397	145	0	0	a)30,5 b) 5,4
2. Maize	18	7	30	14	9,4
3. Soybean	42	15	0	0	7,7
4. Peanut	58	21	8	4	8,8
5. Cassava	15	5	55	25	79,6
6. Sweetpotato	16	6	14	6	54,4
7. Tobacco	25	9	0	0	
8. Other crops	0	0	0	0	
Total use	571	208	107	49	
A r e a	274	100	218	100	

Table 5.3. The intensity and average yield of annual crops at sawah and dry field KABUPATEN BANTUL

	Sawah		Dry field		Average Yield
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	(q/ha)
1. Rice	265	145	5	2	a)31,6 b)10,6
2. Maize	14	8	26	10	9,2
3. Soybean	37	20	3	1	7,3
4. Peanut	27	15	4	2	9,3
5. Cassava	5	3	39	16	72,3
6. Sweetpotato	6	3	3	1	61,2
7. Tobacco	3	1	0	0	
8. Other crops	0	0	0	0	
Total use	357	195	80	32	
A r e a	182	100	251	100	

Table 5.4. The intensity and average yield of annual crops at sawah and dry field KABUPATEN KULONPROGO

	Sawah		Dry field		Average Yield
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	(q/ha)
1. Rice	137	118	0	0	a)23,7 b)18,4
2. Maize	15	13	50	12	6,7
3. Soybean	12	10	10	2	5,8
4. Peanut	4	3	6	1	7,3
5. Cassava	7	6	87	21	44,0
6. Sweetpotato	1	1	2	0	42,3
7. Tobacco	1	1	0	0	
8. Other crops	-	-	---	-	
Total use	177	152	155	36	
A r e a	116	100	415	100	

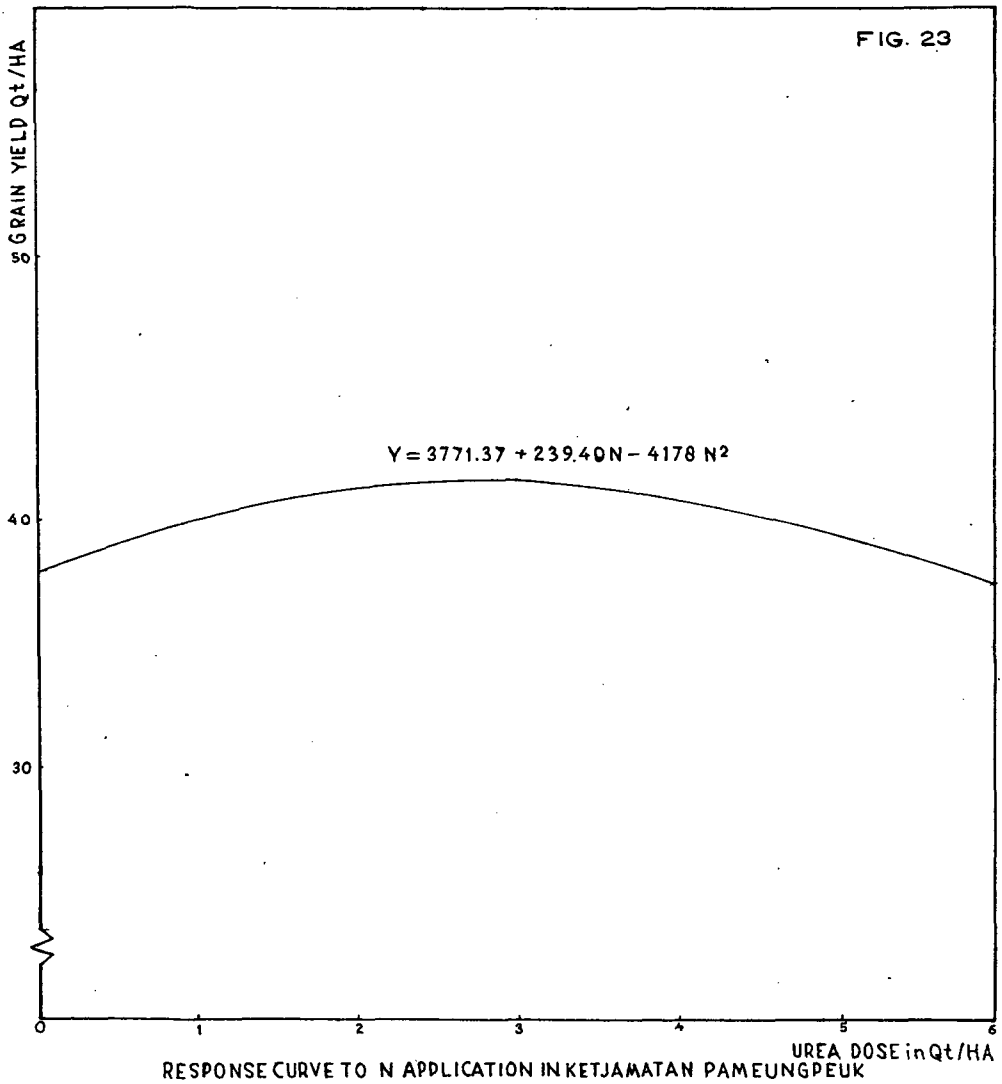
Table 5.5. The intensity and average yield of annual crops at sawah and dry field
KABUPATEN GUNUNGKIDUL

	Sawah		Dry field		Average Yield
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	(q/ha)
1. Rice	60	83	363	29	a)12,9 b)10,8
2. Maize	13	18	209	17	6,8
3. Soybean	6	8	96	8	4,4
4. Peanut	3	4	114	9	4,8
5. Cassava	7	10	356	28	34,0
6. Sweetpotato	0	0	3	0	51,2
7. Tobacco	1	1	10	1	
8. Other crops					
Total use	90	122	1151	92	
A r e a	72	100	1249	100	

Table 5.6. The intensity and average yielf of annual crops at sawah and dry field
KABUPATEN KLATEN

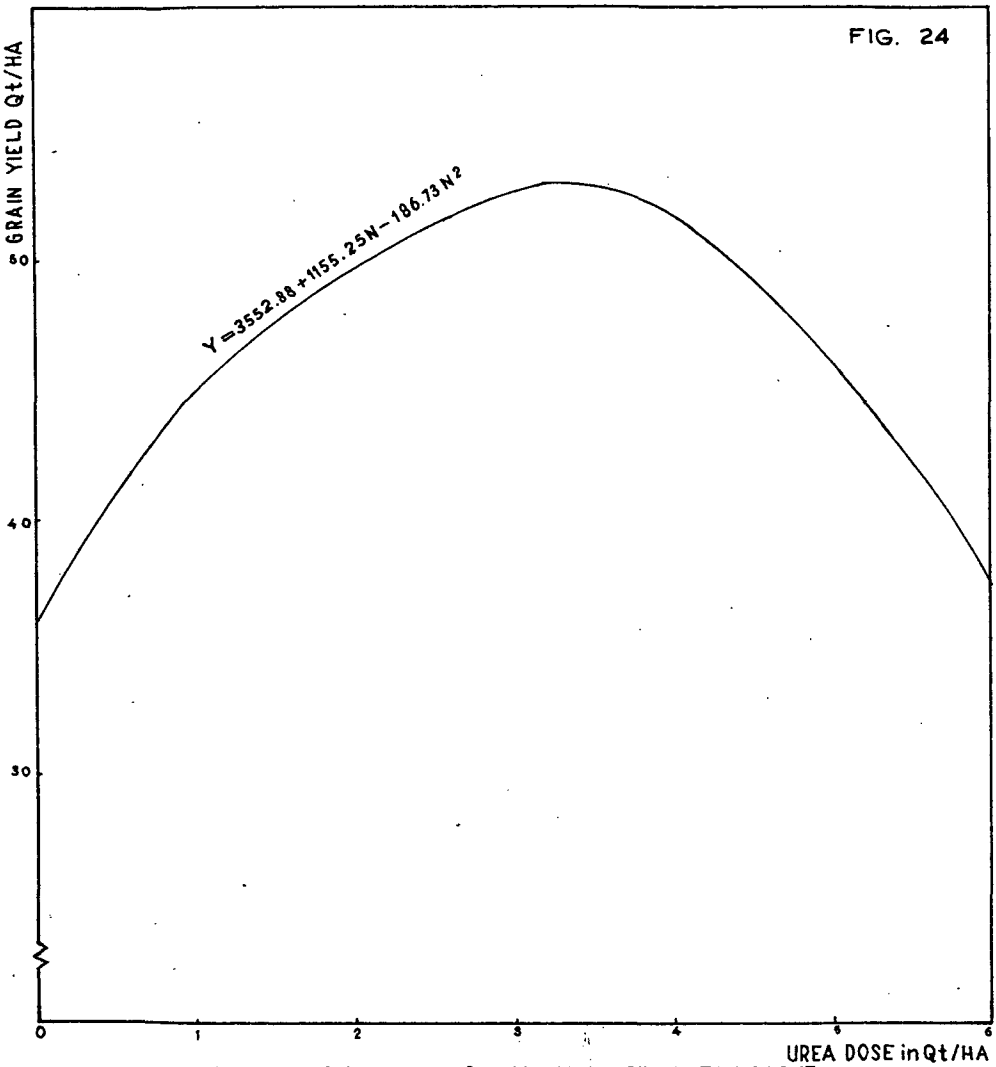
	Sawah		Dry field		Average Yield
	acreage		acreage		
	(100 ha)	(%)	(100 ha)	(%)	(q/ha)
1. Rice	518	144	6	3	a)21,3 b)24,3
2. Maize	18	5	54	22	16,6
3. Soybean	43	12	2	1	7,8
4. Peanut	47	13	7	3	9,7
5. Cassava	10	3	45	19	65,7
6. Sweetpotato	7	2	9	4	67,0
7. Tobacco	16	4	1	0	
8. Other crops	3	1	0	0	
Total use	662	184	123	51	
A r e a	359	100	243	100	

FIG. 23



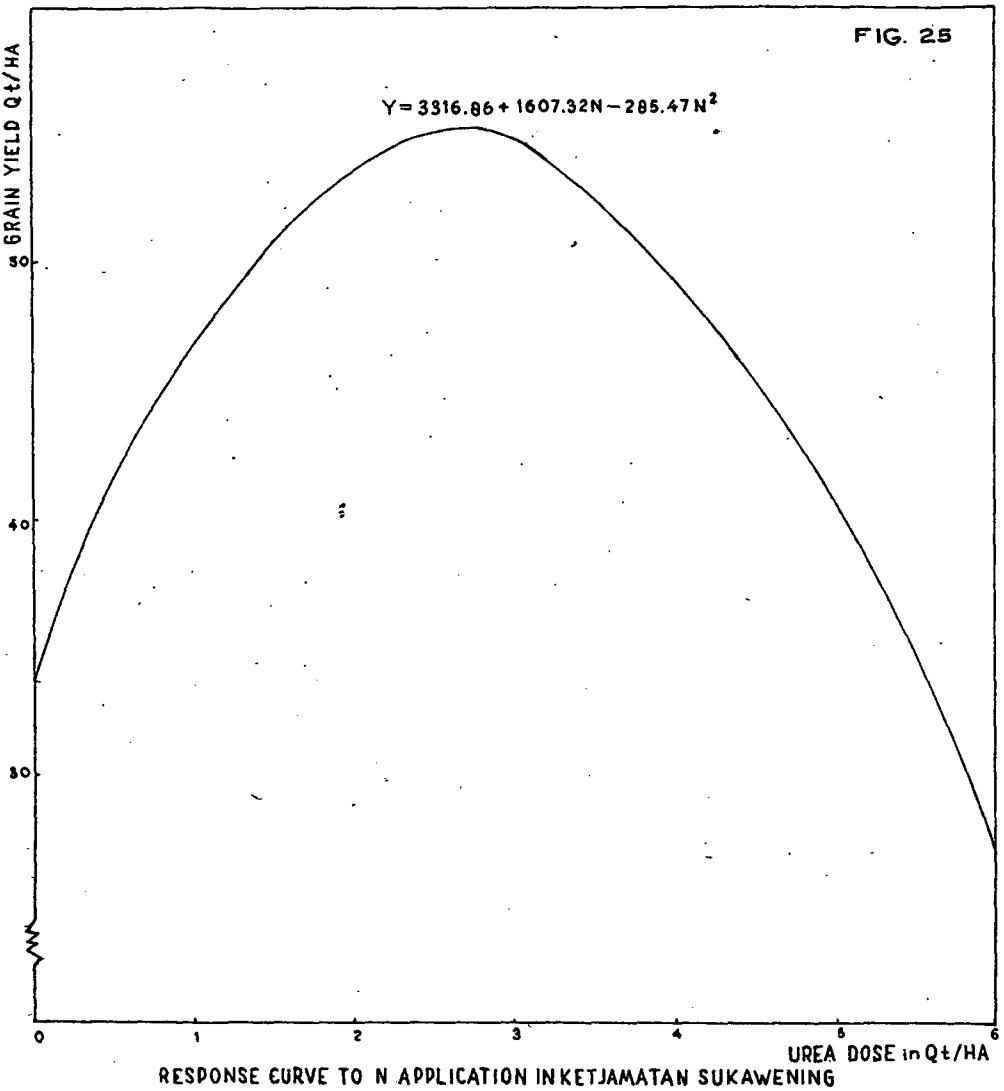
RESPONSE CURVE TO N APPLICATION IN KETJAMATAN PAMEUNGPEUK
(Dewi Ratih variety ; dryseason 1971)

FIG. 24



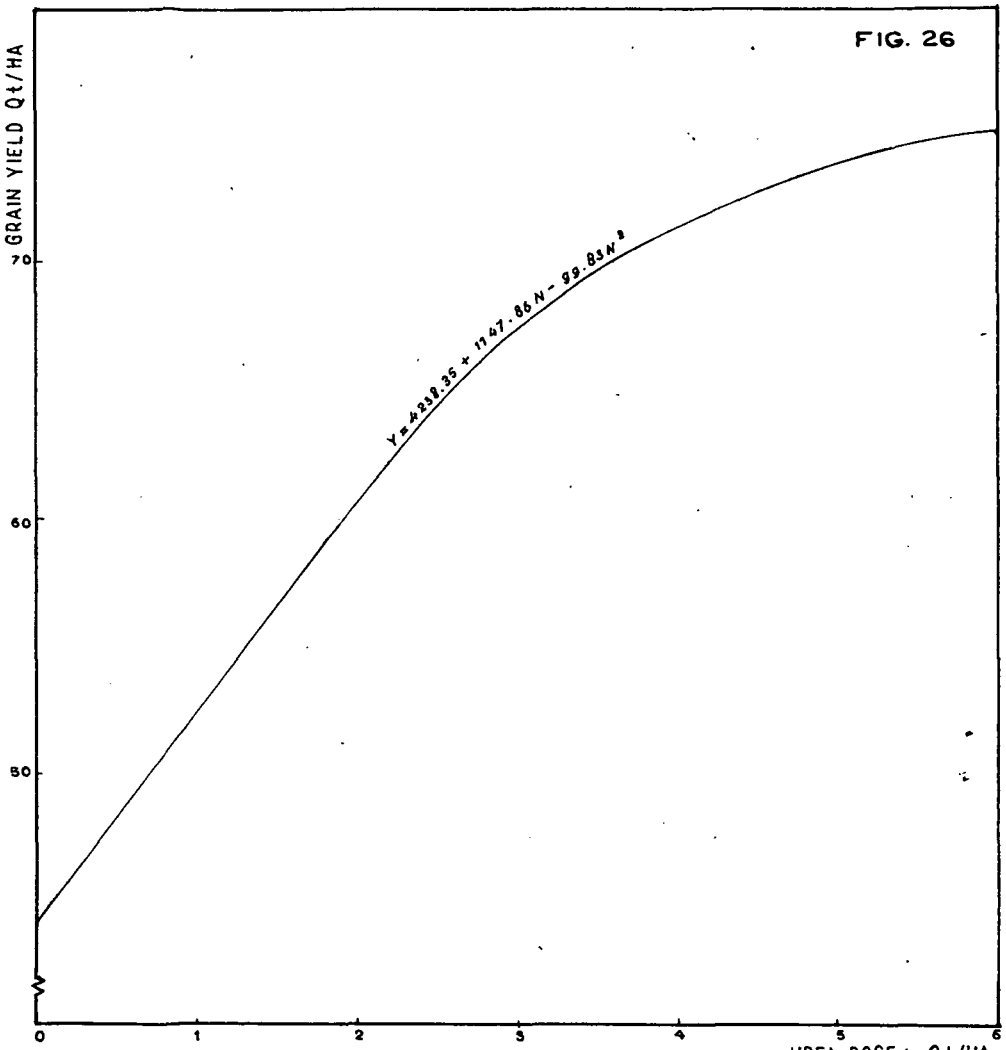
RESPONSE CURVE TO N APPLICATION IN KETJAMATAN GARUT
(Dewi Ratih variety ; dryseason 1971)

FIG. 25

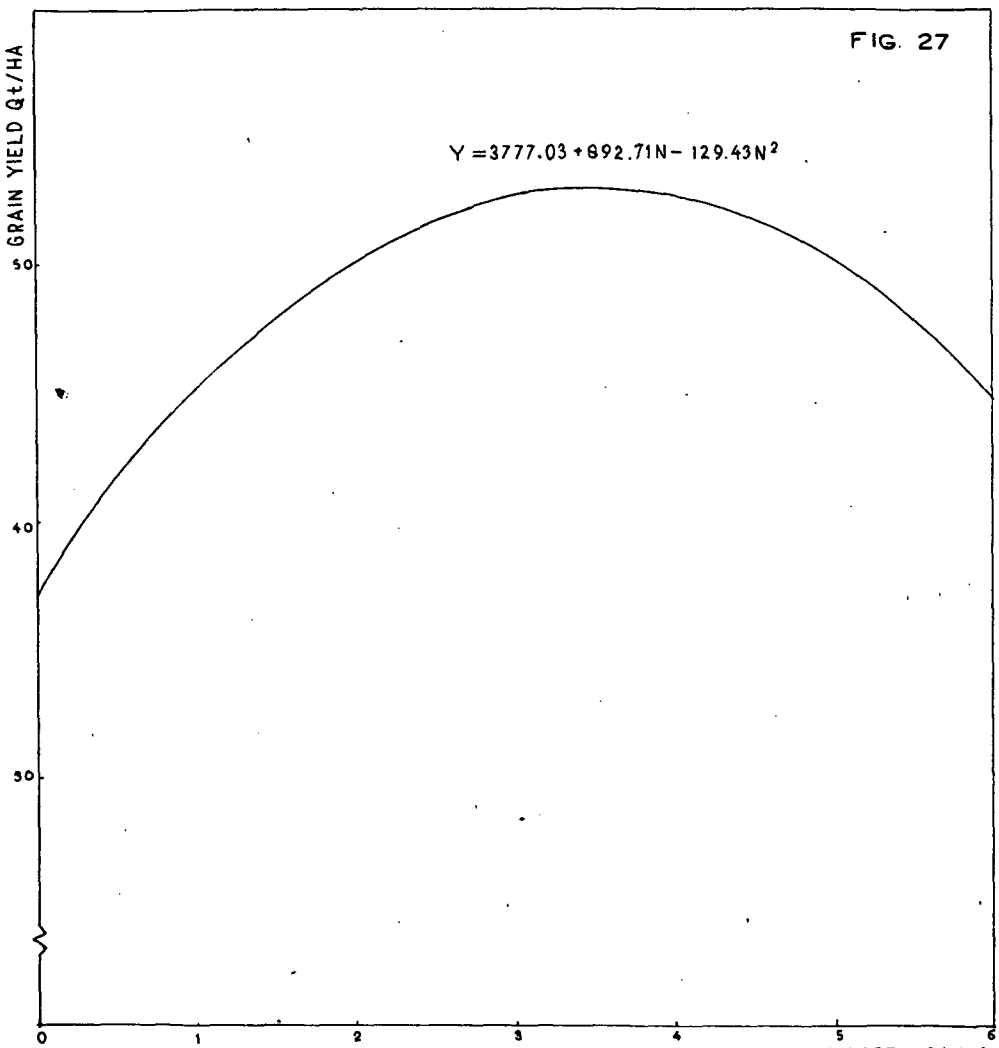


RESPONSE CURVE TO N APPLICATION IN KETJAMATAN SUKAWENING
(Dewi Ratih variety ; dryseason 1971)

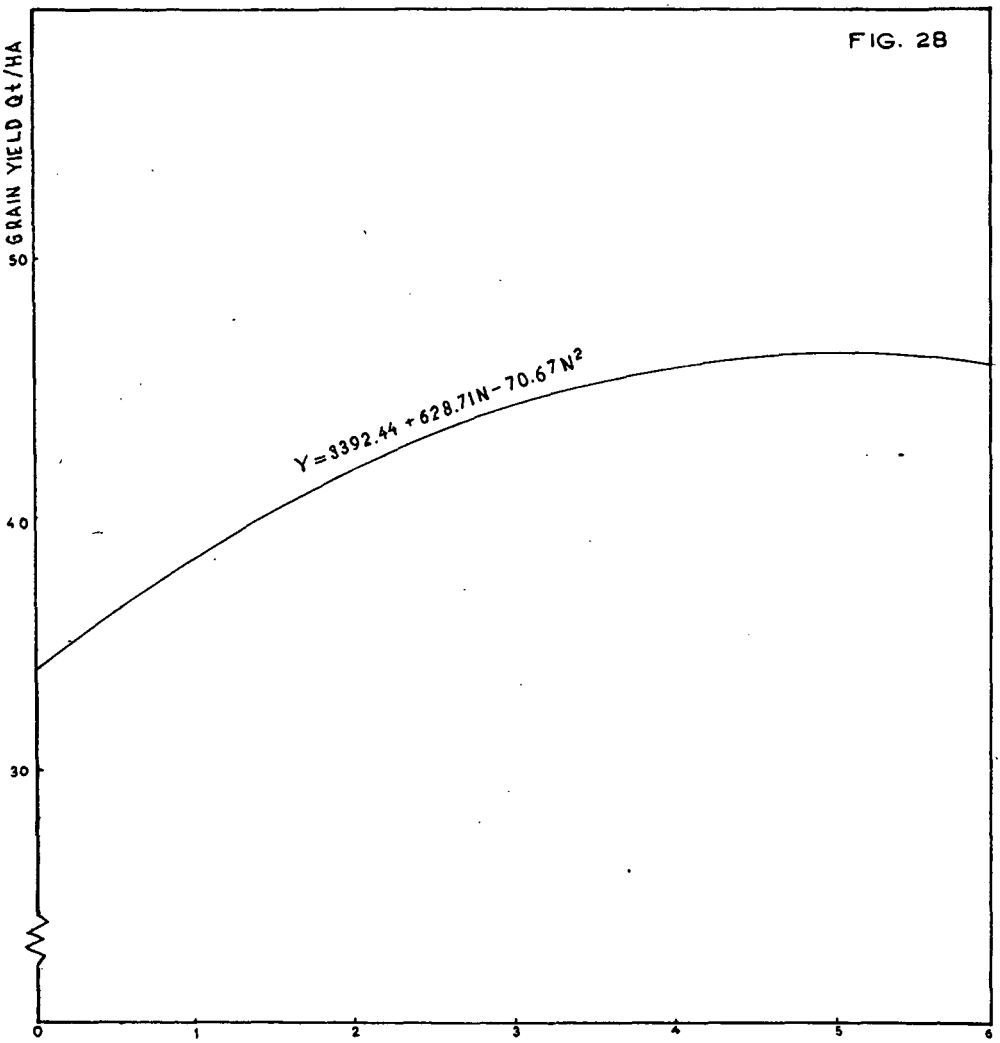
FIG. 26



RESPONSE CURVE TO N APPLICATION IN KETJAMATAN BANJURESMI
(Dewi Ratih variety ; dryseason 1971)



RESPONSE CURVE TO N APPLICATION IN KETJAMATAN KADUNGORA
(C4 − 63 variety ; dryseason 1971)



RESPONSE CURVE TO N APPLICATION IN KETJAMATAN KARANGPAWITAN

(Dewi Ratih variety ; dryseason 1971)