HORTIN II Co Innovation Programme

Towards cost effective, high quality value chains

Improvement of shallot supply chains; visit 24 – 31 July 2010

HORTIN-II Mission Report nr. 36

Rofik Sinung Basuki
Lubbert van den Brink

Lelystad, The Netherlands, Lembang, Indonesia, August 2010
The purpose of the HORTIN-II programme is to contribute to the development of cost effective high quality value chains for vegetables and fruits. Among others this can be achieved when technology development takes place in close collaboration between public institutions, farmers and private companies.

On the Indonesian side the programme is carried out by the Indonesian Centre for Horticultural Research and Development (ICHORD), Jakarta, with the Indonesian Vegetable Research Institute (IVEGRI), Lembang, and the Indonesian Centre for Agricultural Postharvest Research and Development (ICAPRD) in Bogor.

In the Netherlands the Agricultural Economics Research Institute (AEI), Den Haag, the Agrotechnology and Food Sciences Group (ASFG), Wageningen, Applied Plant Research (APR), Lelystad, and WUR-Greenhouse Horticulture (WUR-GH), Bleiswijk, all partners in Wageningen University and Research centre, are involved in the programme.

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Executive summary

From 21 till 31 July 2010 a visit to Indonesia was made by Lubbert van den Brink. The visit was done in the scope of the project “Improvement of shallot supply chains”. The aim of the visit was:

1. To discuss with Rofik Sinung Basuki the demo fields performed on six locations in Indonesia
2. To visit the demo fields in Brebes
3. To prepare the field days
4. To finish the three posters and the leaflet (guideline for growing TSS) made in the Netherlands
5. To discuss with EWSI the results of 2009 and the demo fields and field days of 2010
1. Introduction

The aim of the visit by Lubbert van den Brink to IVEGRI from 21 till 31 July 2010 was to discuss the situation concerning the demofields of 2010 and to prepare the fielddays which will be organized in August/September 2010. The program for 2010 was also discussed with East West Seeds Indonesia. Also new developments with respect to TSS were discussed with EWSI. The demofields in Brebes were visited.

The weather conditions during the dry season of 2010 were totally different from normal. Until the end of July much more rain was falling than normal. It looked like that it was still wet season. This had a negative influence on the quality of the demofields.

Picture 1. Demofield on Mr. Kapandi’s farm in Brebes
2. Demofields and fielddays

The activities concerning the demofields were started in the beginning of 2010 according to the following protocol.

Locations:
Demo fields on key-farms of EWSI: 2 locations in BREBES, 3 locations in NGANJUK and 1 location in YOGJA. The key-farmers will do the sowing and the transplanting. The key-farmers have production field with TSS-material from EWSI and the activities for the demo’s can be done without paying money by IVEGRI/APR. Commercial people or agronomist of EWSI will give advice to the farmers at sowing and transplanting and they will do observations of the demo-plots every two weeks. They will rapport to IVEGRI.

Support and control:
IVEGRI shall give advice and support: At the end of February IVEGRI shall have contact with the key-farmers to ask them to select the field for the demo. In March IVEGRI shall visit the key-farmers and the local EWSI-people to discuss the protocol, the design, etc. of the demo and to give explanations. A soil sample should be taken to measure pH, P and K in the soil. The results of the analysis should be available ca. medio April. In the period May/June/July IVEGRI shall visit the demo’s at least 2 times. IVEGRI will prepare seedbags per row.

Materials:
EWSI will supply seeds of TUKTUK and the new hybrid SANREN. IVEGRI/APR will supply or pay for seed bulbs of the control, extra materials for the demo (stable manure, trays, extra fertilizer and pesticides). IVEGRI will determine thousand kernel weight and germination ability.

Size of the demo; time schedule:
- The nursery for production of seedlings for transplanting fields which should be shown during the field day will be sown ca. end of April. Size of nursery on beds in the field: 40 m2 TUKTUK and 50 m2 SANREN. (If the soil conditions an a location are very poor at the end of April it can be decided to use trays which are bought by IVEGRI in the last years).
- Transplanting will be done five or six weeks after sowing (end of May, beginning of June). Size of the demo production field: 9 beds of minimal 20 m length (3 TUKTUK (transplants), 4 SANREN (transplants), 1 local seed bulb variety (control) and 1 SANREN direct sowing). Planting of seed bulb variety should be done 3 weeks after transplanting TSS.
- Demo nursery will be sown beginning of July. The nursery consists of two beds, one with a shelter and one without a shelter. May be two week later the same nursery could be sown (in case the first nursery is not looking very well)
- Field day/workshop will be done end of July/beginning of August.
- 10 m length of each bed of the production field should be harvested (each variety in his own stage) and 5 days after harvesting the yield with leafs should be measured.

Procedure for nursery sown ca. end of April:
- Beds should be made as early as possible after wet season. At least one month of preparation of the top layer is needed to obtain a good sowing bed. If the quality of the seed bed is not good enough trays should be used (for example in BREBES; IVEGRI has trays)
- If available stable manure or compost should be mixed in the top layer (100 kg per 10 m2).
- Control of soil insect in beds (molecricket, ants, other), 1-2 days before sowing, using a mixture of rice siftings + Dursban (5 kg rice sifting + 100 cc Dursban).
- Before sowing 5 grams Carbufuran, 50 grams KCL and 200 grams SP18 per m2 will be mixed in the top layer.
- Sowing will be done in rows 10 cm from each other; the furrow will be 1 cm deep; per 1,5 m rowlength 2,0 grams Tuktuk or 1,9 grams Hybrid (3000 seeds per m2). Seed will be mixed with rice flour to make regular spreading more easy and to control if seed is sown at the right depth..
- Furrow will be closed with soil or with a mixture of soil and stable manure. It must be controlled if seed is covered with soil. The seed should be covered with 1 cm soil. After sowing watering should be done with a bruze (not too much)
- If available the beds should be covered with plastic during 3 days. If not available the beds should be kept wet (two times a day with a bruze, not too wet)
- After removing the plastic sheet the nursery should be covered with a shelter to protect against heavy rain and sun light. The material for the shelter can be chosen by the farmer based on his experience.
- Pest and diseases should be controlled as good as possible. (a.o. Amistar Top and Score and Tracer). Every day the nursery will be controlled.
- Watering will be done each day carefully with a bruze two times a day: in the early morning and at the end of the day.
- Before transplanting the field should be watered very well and the soil under the rows should be lifted with a small spade before pulling the seeds out of the soil.
- The seedlings should be transplanted until 4 hours after harvesting in the nursery.

Procedure for transplanting/planting/sowing production field:

- The beds should be prepared very well (at least one month of preparation of the top layer)
- Lime should be given if pH is too low. Lime should be given as soon as possible.
- Before transplanting 125 kg P2O5 should be given as SP18, 1 – 5 days before transplanting.
- Transplanting will be done five or six week after sowing the nursery.
- The seedlings will be planted in rows 10 cm from each other. Distance in the row: 6,7 cm to get a plant density of 150 plants/m2 and 13,3 cm to get a plant density of 75 plants/m2.
- Rows should be made with a stick or shown with spots on a rope.
- Seedlings should be transplanted at the right depth (the base of the seedling should be 1,5 a 2 cm in the soil. Soil should be slightly pressed around the seedling.
- The following beds of 20 m length should be transplanted:
  - TUKTUK 150 plants per m2 and 240 kg N/ha; pl spacing: 10x6,7 cm
  - TUKTUK 75 plants per m2 and 240 kg N/ha; pl spacing: 10x13,3 cm
  - TUKTUK 150 plants per m2 and 120 kg N/ha; pl spacing: 10x6,7 cm
  - SANREN 75 plants per m2 and 120 kg N/ha; pl spacing: 10x13,3 cm
  - SANREN 75 plants per m2 and 240 kg N/ha; pl spacing: 10x13,3 cm
  - SANREN 150 plants per m2 and 120 kg N/ha; pl spacing: 10x6,7 cm
  - SANREN 150 plants per m2 and 240 kg N/ha; pl spacing: 10x6,7 cm
- Watering during the first three weeks after transplanting should be done carefully with a bruze at least two times a day. Later on the traditional way of watering could be done.
- At the same time as transplanting TSS one bed of 20 m length will be used for direct sowing. Sowing will be done in rows 10 cm from each other, sowing depth 1 cm, closing the furrow with soil. Seed quantity: ....gram per 0,75 m row length (exact quantity will be calculated based on thousand kernel weight and germination %).
- Three weeks after transplanting TSS seed bulbs of the local seed bulb variety should be planted (15 cm x 20 cm)
- The fertilization of the transplanted plots will be done as follows:
  - 2 weeks after transplanting all plots: 40 kg N/ha (16+16+16)
  - 3 weeks after transplanting only "240 kg plots" 40 kg N/ha (16+16+16)
  - 4 weeks after transplanting all plots: 40 kg N/ha (16+16+16)
  - 5 weeks after transplanting only "240 kg plots" 40 kg N/ha (16+16+16)
  - 6 weeks after transplanting all plots: 40 kg N/ha (16+16+16)+ 75 kg KCL/ha
  - 7 weeks after transplanting only "240 kg plots" 40 kg N/ha (16+16+16)
- The fertilization of the plot with planted seed bulb of the local variety
  - 2 weeks after planting: 40 kg N/ha (16+16+16)
  - 4 weeks after planting: 40 kg N/ha (16+16+16)
  - 6 weeks after planting: 40 kg N/ha (16+16+16) + 75 kg KCL/ha
- The fertilization of the TSS direct sowing plot:
  - 4 weeks after sowing: 40 kg N/ha (16+16+16)
6 weeks after sowing: 40 kg N/ha (16+16+16)
8 weeks after sowing: 40 kg N/ha (16+16+16) + 75 kg KCL/ha

- Control of pests and diseases will be done as optimal as possible (a.o. Amistar Top and Score and Tracer)
- Every two week the beds will be observed by local EWSI-people.

Procedure for demo-nursery:
- Two beds of ca. 11 m length should be prepared very carefully. At least one month of preparation of the top layer is needed to obtain a good sowing bed.
- If available stable manure or compost should be mixed in the top layer (100 kg per 10 m2).
- Control of soil insect in beds (molecricket, ants, other), 1-2 days before sowing, using a mixture of rice siftings + Dursban (dosage will be confirmed).
- Before sowing 5 grams Carbufuran, 50 grams KCL and 100 grams SP18 per m2 will be mixed in the top layer.
- Sowing will be done in rows 10 cm from each other; the furrow will be 1 cm deep; per 1.5 m rowlength 2,0 grams TUKTUK (3000 seeds per m2). Seed will be mixed with rice flour to make regular spreading more easy and to control if seed is sown at the right depth.
- The following treatments will be sown on each bed (seed quantities will be calculated based on thousand kernel weight and germination %) (It must be controlled if the seed is covered well with soil or rice husks):
  1. 20 rows (10 cm from each other) on a bed sown at a depth of 1 cm and furrow closed with soil.
  2. 20 rows (10 cm from each other) on a bed sown at a depth of 0,25 cm and furrow closed with soil
  3. 20 rows (10 cm from each other) on a bed sown at a depth of 1 cm and furrow closed with fermented rice husks
  4. 20 rows (10 cm from each other) on a bed sown at a depth of 1 cm, furrow closed with soil, without watering after sowing
  5. Broadcasted plot (To compare with the other treatments); 2,0 m length of a bed. (seed density will be calculated later on)
  6. 4 trays with nursery mixture 1 (paddy field soil: sandy soil: stable manure) sown 1 cm deep and furrow closed with mixture
  7. 4 trays with nursery mixture 2 (the farmer can choose his own mixture) sown 1 cm deep (1,0 gram Tuktuk/tray) and furrow closed with mixture
- Directly after sowing both beds will be watered, except treatment 4
- After sowing and watering 1 bed will be covered with plastic sheet which will be removed after 3 days. After these 3 days a shelter will be put over the bed to protect against heavy rain. The other bed will be uncovered.
- The uncovered bed will be watered two times a day to keep the soil wet enough for germination of the seed (carefully with a bruze), at least two times a day: in the early morning and at the end of the day
- Also on the other bed after removing the plastic sheet watering will be done carefully every day with a bruze at least two times a day: in the early morning and at the the end of the day.
- Pest and diseases should be controlled as good as possible (Amistar Top ans Score). Every day the nursery will be controlled.

At the moment of the visit two locations were lost because of too much damage caused by the heavy rainfall: the location in Yogja (farmer: Nardi; even a second nursery was damaged severely; nurseries sown on 10 May and 4 June) and one of the locations in Nganjuk (Nyono; nursery sown 22 April; transplanting 6 June).

The situation on the locations will be described in chapter 4.

Mr Puji in Nganjuk has sown the nursery on 27 April and the transplanting has been done on 11 June. The demofield looks good until now. Mr. Wono has sown the nursery on 17 April and the transplanting has been done on 29 May. The demofield was performing well and it was decided to organize a fieldday in the beginning of August.
For the field days 3 posters were produced in Lelystad (see Appendix I). On the posters the most important results of 2007-2009 were mentioned (see Appendix II). They will be presented on the fielddays. Also a leaflet was made in which the growing technique is described based on the results obtained in the HORTIN-project during the years 2007 – 2009. This leaflet will be given to every visitor of the fielddays and is also available for other people. A presentation about the most important results of 2007 – 2009 is made and will be presented on the fielddays by Rofik. The keyfarmer will be asked to present the demofields. The questionnaire is made by Rofik. Visitors will be asked to fill in their evaluation of the different demplots.
3. Discussion with East West Seeds Indonesia

On July 27 there was a meeting with Rien Rodenburg and Asep Harpenas in Lembang. They agree with our activities in the project and they will ask the commercial people to support the activities on the field days. They will supply a beamer. And as possible they will be present with a stand. We are expecting to have 4 field days. Each with 30 – 40 farmers. There will be a research session (Rolik), a demplot session (farmer) and a disease session (EWSI).

EWSI is now on the point that they believe it can be too difficult for farmer to produce TSS with transplanted seedlings. They are now thinking about producing mini-tubers which will be produced on a high density nursery field (about 1000 plants per m2) during ca. 70 days. These mini-tubers will be stored over the wet season period. For example sowing in august/September, harvesting October/November and planting in the next dry season. At least 1 month for breaking dormancy is needed. With 5-7 grams mini-tubers ca. 60 minitubers per m2 will be planted. Probably there will be a company which will produce mini-tubers. The company will have more locations to keep transport at a low level.

EWSI needs the data of the storage experiment of 2009. They are especially interested in the influence of nitrogen on storage. Lubbert shall analyse the data obtained from Irin.

According to Rien seedlings can be raised at a density of 3000 seedlings per m2. Irin says for mini-tubers 7 cm between rows and 1 cm in the row.

Seed efficiency is low in practice if compared to EWSI in trays (20-40% while in trays 80%). The difference could be due to the soil: in the trays a mixture of soil, manure and burned rice husks was used. The mixture was steamed. In practice sowing was done on a seedbed in the field.

In 2008 2000 kg seed of Tuktuk was sold, in 2007 nothing; in 2009 200 kg and in 2010 it will be less than 200 kg. In 2010 no commercial seed of Sanren is available. The seed production in South Africa seems to be good and it is estimated that 400 kg will be available in 2011. EWSI has still Tuktuk in store and they would like to sell it. We shall keep in touch with EWSI about the moments of the field days.
4. Visit to demofields in Brebes

On 28 and 29 July the demofields were visited in Brebes and it was discussed if the field days could be organized on the locations of the keyfarmers Yus and Kapandi.

The nursery for the production of the transplanted demofield of keyfarmer Kapandi was sown on 11 April. Transplanting was done 25 May. At the moment of the visit the transplanted demofields were 70 days old. Although very intensive spraying with fungicides (once in two days) the plots were attacked by Perenospora, Antracnose and Alternaria. This was due to the wet weather conditions. Especially Tuktuk was suffering more than Sanren and the bulb seed crop. The bulb seed crops showed less symptoms. The direct seeding plot was not sown, because Mr. Yus does not believe in this. Instead of this treatment an extra treatment with Sanren was included: transplanting at 10 x 15 cm, the same plant spacing as traditional seed bulb crops in this area. Until now the intention is to organize a field day on 10 August. Unless the damage by diseases it is decided to go on with the activities for the organization of this day. The demo plots are giving a good impression of the possibilities of TSS. On the field day 3 m of each plot will be harvested for showing the yield to the farmers. Later on 10 m of each plot will be harvested for determination of the yield.

Rofik has made a questionnaire on which farmers can score their opinion for growth, yield, colour, size and susceptibility to diseases. The plots were scored by ourselves and the results are given in table 1.
Table 1. Demofield of Mr. Kapandi. Estimated percentage of damage by diseases and general performance (expectation of yield)

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<th>Estimation of damage by diseases (%)</th>
<th>General performance (1 = the worst one; 9= the best one)</th>
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<td>Tuktuk 150 pl/m2; 240 kg N</td>
<td>80</td>
<td>2</td>
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<tr>
<td>Tuktuk 75 pl/m2; 240 kg N</td>
<td>75</td>
<td>3</td>
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<td>Tuktuk 150 pl/m2; 120 kg N</td>
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<td>Sanren 75 pl/m2; 120 kg N</td>
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<td>5.5</td>
</tr>
<tr>
<td>Sanren 75 pl/m2; 240 kg N</td>
<td>25</td>
<td>6</td>
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<tr>
<td>Sanren 150 pl/m2; 120 kg N</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>Sanren 150 pl/m2; 240 kg N</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>Sanren 16x10</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>Seed bulb</td>
<td>15</td>
<td>8</td>
</tr>
</tbody>
</table>

The demo nursery was sown on 24 June and was looking very good. The impression was that sowing at 1 cm deep is better than sowing on 0,25 cm. Broadcasting seed looks less good than sowing on rows. It will be tried to do counting in the nursery.
Picture 6. Overview nursery demo on Mr. Kapandi's farm

Picture 7. TSS sown in rows on seedbed in the field in nursery demo on Mr. Kapandi's farm
The nursery for the production of the transplanted demo field of keyfarmer Yus was sown on 6 May. Transplanting was done 22 June. At the moment was of the visit the transplanted demo fields were 50 days old. Although very intensive spraying with fungicides (once in two days) the plots were attacked by Perenospora, Antracnose and Alternaria. This was due to the wet weather conditions. There were differences between the plots in disease attack. Tuktuk has suffered most from diseases. Sanren was showing less symptoms than Tuktuk and the local seed bulb variety suffered less. The plots with

![Overview transplanted fields in demo of Mr. Yus](image)

**Picture 8. Overview transplanted fields in demo of Mr. Yus**

Tuktuk were not looking well and it can be expected that at the moment of the field day, ca. 3 or 4 weeks from now, the plots had probably only a few plants alive. Sanren was performing much better, but also for this variety there are doubts about the performance on the moment of the field day. Mr Yus has given less fertilizer than prescribed in the protocol, because he has the opinion that less nitrogen is better under wet conditions. The direct seeding plot was not sown, because Mr. Yus does not believe in this. Instead of this treatment an extra treatment with Sanren was included: transplanting at 10 x 15 cm, the same plant spacing as traditional seed bulb crops in this area.

It was decided to propose to EWSI and the farmers to skip the field day on the farm of Mr. Yus and to invite the group of farmers surrounding Mr. Yus for a field day on the demo field of Mr. Kapandi. This can be done, because the distance between the farm of Mr Kapandi and the farm of Mr. Yus is only 10 minutes driving by motorbike. Because of the bad weather conditions it was already decided that Mr Yus has not sown the nursery-demo.
Pictures 9 and 10. Bima curut (seed bulb crop) and TSS Sanren 150 plants per m2 on demo of Mr. Yus

Table 2. Demofield of Mr. Yus. Estimated percentage of damage by diseases and general performance (expectation of yield)

<table>
<thead>
<tr>
<th>Variety</th>
<th>Estimation of damage by diseases (%)</th>
<th>General performance (1 = the worst one; 9 = the best one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuktuk 150 pl/m2; 240 kg N</td>
<td>80</td>
<td>1</td>
</tr>
<tr>
<td>Tuktuk 150 pl/m2; 120 kg N</td>
<td>70</td>
<td>3</td>
</tr>
<tr>
<td>Tuktuk 75 pl/m2; 120 kg N</td>
<td>85</td>
<td>1</td>
</tr>
<tr>
<td>Sanren 75 pl/m2; 240 kg N</td>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td>Sanren 75 pl/m2; 120 kg N</td>
<td>50</td>
<td>5</td>
</tr>
<tr>
<td>Sanren 150 pl/m2; 240 kg N</td>
<td>30</td>
<td>9</td>
</tr>
<tr>
<td>Sanren 150 pl/m2; 120 kg N</td>
<td>30</td>
<td>9</td>
</tr>
<tr>
<td>Sanren 17x10; 120 kg N/ha</td>
<td>30</td>
<td>6</td>
</tr>
<tr>
<td>Seed bulb 120 kg N/ha</td>
<td>15</td>
<td>7</td>
</tr>
</tbody>
</table>

On the farm of Mr. Yus a very big nursery was sown with Sanren. The nursery was about 3 weeks old and was looking very well.

Before sowing seedbed was prepared during 20 days. Watermelon has been grown on the field. Rows of 1 m were sown with 2 grams of seed. The furrow was ca. 1 cm deep and after sowing the furrow was closed with dry soil. After sowing the nursery was covered with sugarcane leaves during 3 days. After this a cover with plastic was placed over de nursery during the night. This cover will stay until 20 days after sowing. The emergence was rather good (estimated at 50-60%; Yus expects that seedlings will be lost in the coming period until transplanting.
An interesting point was that the demo was sown with soaked seed. The seed was put in water the day before sowing from 6.00 until 18.00. During the night the seed was dried. Mr. Yus showed us also a part of the demo on which unsoaked seed was sown and this part was showing less good (see picture).

*Picture 10. Overview of nursery of Mr Yus*

*Picture 11. Effect of soaked seed: on the right soaked seed, on the left unsoaked seed.*
Mr. Yus is estimating that seed bulb crops are giving on average in this region 7.5 tons/ha in the wet season, in the dry season 12-15 tons per ha (yield with leaves 8 days after harvest with leaves; netto 7000 m²). Mr. Yus is planting the seedbulb crops at 15 x 10 cm (60 bulbs per m²). With seedbulbs three months stored this means 1500 kg seedbulbs per ha. With seedbulbs one month stored 2000 kg seedbulbs per ha.

Sanren is now accepted by the market and the same price is given as for seed bulb varieties. The price of Tuktuk is lower. For instance if Sanren is giving 7000 IDR Tuktuk is giving 6000 IDR.

Yus has used Amistar Top and Daconil and Ridomil. But Rofik is not sure if the last two were available. Rofik got the following advices from the extension service: Perenospora: Foliarfos 400 ES, Agrorfos 400 ES; Antracnose: Polycom 70 WJ, Derosal 60 WP, Derosal 500 SC, Delesneijm x80wp, Phytocarp 50 WP; Alternaria: Anvil 50 SC. However most of these fungicides were not available.

Farmer told us that he has 700 kg seed bulbs and he could get a price of 25000 IDR/kg. This amount of seed bulbs is enough for 3500 m² net, planted at 10 x 15 cm. However he did not sell, because he is trusting more in his seed bulbs than in Tuktuk. He needs 2 – 3 kg seed of Tuktuk with a price of 1200.000 IDR/kg. His experiences with Tuktuk were too bad. If he could buy Sanren he has probably done.
5. **List of actions**

In the following table a list of actions is given.

<table>
<thead>
<tr>
<th>Nr</th>
<th>Action</th>
<th>Who</th>
<th>When</th>
<th>Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Organizing fieldays on the locations of Mr Kapandi (2 times)</td>
<td>Rofik</td>
<td>Week of 10 August</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organizing fieldday on the location of Mr Wono</td>
<td>Rofik</td>
<td>First week of August</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organizing fieldday on the location of Mr. Puji</td>
<td>Rofik</td>
<td>End of August</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Measuring the yield after 5 days drying on the locations of Mr. Kapandi, Mr. Yus, Mr Wono and Mr Puji</td>
<td>Rofik</td>
<td>August/September</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Counting the number of seedlings on the demo-nurseries of Mr Kapandi, Mr. Wono and Mr. Puji (10 representative rows in the treatments sown on rows; the whole plot on the broadcasted plot; every tray)</td>
<td>Rofik</td>
<td>August/September</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Discussion with Marcel about the treatment which has to be analysed economically</td>
<td>Lubbert</td>
<td>August</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sending extra money for the fieldays</td>
<td>Lubbert</td>
<td>August</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Making overview of results 2007, 2008 and 2009; Writing Final Report</td>
<td>Lubbert/Rofik</td>
<td>August-December</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Writing articles (nursery and transplanted fields</td>
<td>Lubbert/Rofik</td>
<td>August-December</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Analysing results Storage experiment</td>
<td>Lubbert</td>
<td>August</td>
<td></td>
</tr>
</tbody>
</table>
Annex I. Posters presented on field days in 2010

Penelitian teknik persemiaan Biji Botani Bawang Merah

Dr. Rofik Sinung Basuki dan Jr. Lubbert van den Brink

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Persemian di bedengan atau di bali
Dibandingkan dengan persemian di bali, persemian di bedengan mempunyai beberapa keuntungan dan kekurang yaitu:
- Biaya yang lebih murah (bali, tanah, pupuk kandang)
- Kebutuhan tenaga kerja lebih sedikit (membuat media persemiaan, mengisi media di bali)
- Efisiensi bumi lebih rendah (dalam percobaan efisiensi bumi di bedengan mencapai 50% sedangkan di bali 82%)
- Tenggara pada kondisi tanah yang ada (sekatlah pada, kondisi tanah jelek); persiapan lahan harus dilakukan secara hat-hati.

Teknik untuk mendapatkan hasil persemiaan yang optimal
Untuk mendapatkan hasil persemiaan yang optimal, perlu dilakukan:
- Penyemaian naungan persemiaan, untuk melindungi dari hujan deras dan terik matahari
- Pengendalian hama brombong, spodoptera dan penyakit (Anthracnosis)
- Penyemaian dilakukan sebagai berikut:
  * Di dalam gantam, dengan jarak gantam 7-10 cm
  * Kedalaman serasi 1-1,5 cm
  * Jumlah bumi disesuaikan 300 bumi per m²
  * Gantam harus ditutup dengan tanah atau media persemiaan
  * Agar bumi dapat diserap air dengan kecepatan yang tepat, bumi harus kelihatan (misalnya, sisipkan dengan beras merah)
- Penyemaian harus dilakukan 2-3 kali setiap secara hat-hati (menggunakan gombrir air yg menghasilkan tekanan air yang kecil)

Pengaruh dari kedalaman samai dan pupuk menggunakan arang selain dan tanah terhadap efisiensi bumi (%)

<table>
<thead>
<tr>
<th>Perusahaan 1</th>
<th>Perusahaan 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arang selain</td>
<td>Tanah</td>
</tr>
<tr>
<td>Di bali</td>
<td></td>
</tr>
<tr>
<td>0,25 cm</td>
<td>23</td>
</tr>
<tr>
<td>0,50 cm</td>
<td>33</td>
</tr>
<tr>
<td>1,00 cm</td>
<td>41</td>
</tr>
<tr>
<td>1,50 cm</td>
<td>44</td>
</tr>
<tr>
<td>Di bengkel</td>
<td></td>
</tr>
<tr>
<td>0,25 cm</td>
<td>25</td>
</tr>
<tr>
<td>0,50 cm</td>
<td>27</td>
</tr>
<tr>
<td>1,00 cm</td>
<td>24</td>
</tr>
<tr>
<td>1,50 cm</td>
<td>28</td>
</tr>
</tbody>
</table>

Perkiraan biaya persemiaan
Biaya Pemeliharaan di bengkel, untuk penanaman 1600 m², dengan luas persemiaan 140 m² (300 bumi/m², efisiensi bumi 40%)

<table>
<thead>
<tr>
<th>Jumlah</th>
<th>Biaya</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>1200</td>
<td>15200</td>
</tr>
<tr>
<td>Pupuk kandang 250 kg</td>
<td>400</td>
<td>1800</td>
</tr>
</tbody>
</table>

Terugsah lain:
- Penyemaian (P): 0,4 hari | 25.000 | 200.000 |
- Penyemaian (PA): 4,6 hari | 130.000 | 690.000 |
- Penyemaian (P): 2 hari | 25.000 | 50.000 |
- Penyemaian (P): 0,7 hari | 75.000 | 245.000 |
- Penyemaian (P): 1,8 hari | 25.000 | 100.000 |
| Total | | 328.000 |

Biaya bahan:
- Bembu: 1,7 stems 75.000 127.500 |
- Kacang 1,7 kg 15.000 25.500 |
- Pakis tanza 0,75 m 1.000 32.000 |
- Dedak 0,75 g 5.000 8.500 |
- Trisil 0,09 l 80.000 7.360 |
- NPK 1,4 kg 15.000 32.000 |
- Total 328.000 |

* P = Pupuk, W = Waktu
Penelitian teknik pindah tanam dan produksi bawang merah menggunakan Biji Botani Bawang Merah

Dr. Refik Sinug Basuki dan Ir. Lubbert van den Brink

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Pindah tanam
Secara umum, bibit umur lima (di dataran rendah) dan enam (di dataran tinggi) minggu setelah semai, dapat bertahan hidup dengan baik (sekitar 95%) setelah ditanam di lapangan. Sebelum bibit dicabut dari persimpanan, disarankan bedingan drainasi halus dan tanah di sekitar gairah dicongkel dan pisau atau secop kecil. Bibit ditanyan dengan kedalaman antara 1,5-2 cm.

 Produktivitas
Hasil bawang merah dari TSS lebih tinggi dibanding dengan benih umbi bawang. Hasil rata-rata Tuktuk dengan kerapatan 150 tanaman/m² yang ditanam pada percobaan di Brebes pada bulan Mei tahun 2008 dan 2009 adalah 70% lebih tinggi dari hasil Bima Curut. Sedangkan Sanren dengan kerapatan 150 tanaman/ha hanya 25% lebih tinggi dibanding dengan Tuktuk.

<table>
<thead>
<tr>
<th>Hasil (ton/1600 m²) di percoobaan 2008 dan 2009</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percobaan</td>
<td>Percobaan</td>
<td>Percobaan</td>
</tr>
<tr>
<td>kerapatan tanaman</td>
<td>kerapatan</td>
<td>Pupuk N</td>
</tr>
<tr>
<td>Tuktuk 150 tanaman/m²</td>
<td>6,8</td>
<td>2,7</td>
</tr>
<tr>
<td>Sanren 150 tanaman/m²</td>
<td>6,8</td>
<td>3,4</td>
</tr>
<tr>
<td>Bima Curut</td>
<td>2,3</td>
<td>2,2</td>
</tr>
<tr>
<td>*Hasil TSS merupakan rata-rata 126 dan 175 ton/ha</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pengaruh kerapatan tanaman terhadap hasil (ton/ha per 1600 m²)

Pemupukan Nitrogen
Ada perbedaan antar varietas dalam hal pemupukan nitrogen yang optimal untuk Tuktuk pemberian pupuk nitrogen lebih tinggi dari 120 kg/ha tidak meningkatkan hasil, bahkan menurunkan kualitas hasil. Sanren dengan pemupukan 300 kg/ha hanya 29% lebih tinggi dibanding Sanren dengan pemupukan 120 kg/ha. Peningkatan hasil terjadi, tanpa menurunkan kualitas hasil.

Pengaruh pemupukan nitrogen terhadap hasil (ton/ha per 1600 m²)

Dilihat dari Penelitian Tanaman Sayuran (Balitsa).
Indonesian Vegetable Research Institute (Bogor)
Jl. Rangka Kera no. 367
Bogor: Bandung: 40391
Tel: +62-22-2786245
Analisis usahatani bawang merah menggunakan benih
Biji Botani Bawang Merah dan benih umbi

Dr. Rofik Siming Basuki dan Ir. Lubbert van den Brink
email: rofik@balitsa.com, email: lubbert@wageningenuniversity.nl

Analisis usahatani

Penilaian analisis usahatani bawang merah menggunakan benih Biji Botani Bawang Merah dan benih umbi dibuat berdasarkan situasi berikut:

- Luas usahatani 1600 m² bruto (termasuk selokan; 1120 m² neto)
- Harga benih umbi: Rp. 16000,- per kg
- Luas persemanan di lepasan 140 m²
- Jumlah biji biji botani disemai: 3000 biji per m²
- Botol biji biji botani per 1000 biji adalah 3 gram
- Harga benih biji botani: Rp 1.200.000,- per kg
- Efisiensi budi: 40%
- Persentase dini nasungan plastik kasa
- Tanaman dari benih umbi diperlihatkan umur 8 minggu
- Tanaman dari benih biji botani diperlihatkan umur 11 minggu

Hasil berdasarkan penelitian tahun 2008 dan 2009 di
Bijis Tuk Tuk 3900 kg/1600 m² dan Bima Guntur 2250
kg/1600 m²

Biji sangat kenapa berbesar penelitian pencatatan yang dilakukan pada penelitian tahun 2008 (i.e. 2009). Mungkin
dalam praktik secara langsung juga tanpa korak akan lebih
efektif.

Pembuatan bibit berdasarkan data percontohan. Mungkin
dalam praktik secara langsung akan lebih mudah.

Harga hasil Rp. 50.000,- per kg, sama untuk hasil dari benih
bibi botani maupun benih umbi. Dalam praktikknya, harga
terdahulu mungkin berubah.

Penelitian ini dimaksudkan untuk memberikan gambaran tentang
ada perbedaan di produksi. Jika kondisi benih atau hanya
berubah dari budi yang digunakan dalam perhitungan, maka perlu
dilakukan penelitian ulang.

<table>
<thead>
<tr>
<th>Benih dan Spesifikasi Biji Botani</th>
<th>Hasil Analisis</th>
<th>Keterangan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luas (m²)</td>
<td>1600</td>
<td>Bruto (termasuk selokan) 1120 m² neto</td>
</tr>
<tr>
<td>Jumlah biji botani disemai</td>
<td>3000 biji per m²</td>
<td></td>
</tr>
<tr>
<td>Harga benih biji botani per 1000 biji</td>
<td>3 gram</td>
<td></td>
</tr>
<tr>
<td>Harga benih umbi</td>
<td>Rp 16000,- per kg</td>
<td></td>
</tr>
<tr>
<td>Efisiensi budi</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>Persentase dini nasungan plastik kasa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Umur tanaman dari benih umbi</td>
<td>8 minggu</td>
<td></td>
</tr>
<tr>
<td>Umur tanaman dari benih biji botani</td>
<td>11 minggu</td>
<td></td>
</tr>
</tbody>
</table>

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Applied Plant Research
Leibnitzweg 3
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Tel. +31-390-291111

Balitbang Tanaman Sayuran [Balitsa]
Indonesian Vegetable Research Institute [IVRI]
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Tel. +62-22-2788245
Annex II. Leaflet handed out to visitors of the field days

Teknik Produksi Bawang Merah Menggunakan Biji Botani

HORTIN II Program: January-July 2010
For promotion and passers-by that interested in the techniques that are implemented.

Dr. Rofik Sinung Basuki dan Ir. Lubbert van den Brink
E-mail: rofik@itomtel.com, e-mail: lubbert.vandendebrink@wur.nl

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Basis Panitia Penelitian Tepan (Balitsa)
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Lebakang, Bandung 40291
Tel. +62 22 790 0493
Teknik Produksi Bawang Merah Menggunakan Biji Botani

Penggunaan biji botani dalam produksi bawang merah (Allium sativum L.) telah dikembangkan untuk meningkatkan produktivitas tanaman. Teknik ini melibatkan penanaman biji botani yang telah dipotong kecil ke dalam tanah. Biji botani ini biasa ditanam pada tanah dengan kedalaman 1 cm, kemudian diberi pupuk dan air. Peningkatan produktivitas dapat mencapai 20-30% dibandingkan dengan metode konvensional.

Persyaratan

Persyaratan tanah dan cuaca sangat penting dalam teknik ini. Tanah harus subur, kandungan karbon dioksida yang tinggi, dan drainase yang baik agar biji botani dapat tumbuh dengan baik. Cuaca yang hangat dan cuaca yang lembab juga sangat diperlukan untuk tumbuhan ini.

Persyaratan Tanah

1. Tanah dengan pH 6-7.5
2. Kandungan karbon dioksida lebih dari 6%
3. Kadar air yang cukup tetapi tidak terlalu lembab

Pengendalian Hama dan Penyakit

Pengendalian hama dan penyakit dilakukan dengan memberikan perlakuan yang tepat. Pemberian pupuk dan air yang cukup dapat mengurangi serangan hama dan penyakit. Pemotongan biji botani yang bagus juga dapat mengurangi serangan hama dan penyakit.

Penyelaman Biji Botani

Biji botani yang telah dipotong kecil ke dalam tanah kemudian diberi pupuk dan air. Pupuk yang diberikan adalah pupuk kompos atau pupuk kimia yang memenuhi standar kebutuhan tanaman.

Pemanfaatan Biji Botani

Biji botani yang telah tumbuh dan berbawang dapat digunakan sebagai biji untuk tanaman bawang merah yang akan ditanam kembali. Biji botani ini mampu menghasilkan bawang yang berkualitas tinggi dan produktivitas yang tinggi.

Ukuran Tanaman

Ukuran tanaman bawang merah yang ditanam menggunakan biji botani meliputi tinggi tanaman, panjang batang, dan berat bawang. Ukuran ini ditentukan berdasarkan kualitas biji botani, tanah, dan cuaca di lokasi penanaman.
Pensan dibutuhkan
Bibit dapat diperpanjang pada air 5 mg/L di dalam rendam, dan 6 mg/L di dalam hujan. Bibit harus diperpanjang 2-3
dan. Selama bibit di palung, perlu diperpanjang para para, dan
sabun bibit dicuci, tanah dibuat dan perlu diperpanjang
dalam dengan pisau atau alat lain. Dengan cara ini, bibit mudah
dicuci dan tetap segar antara waktu yang telah lama. Selanjut-
yang bibit tahan di lapangan 34 jam sebelum dipanen.

2. Persamaan menggunakan bahan biji penggalan
Buku darat dengan media persenase yang terdiri dari campuran tanah berpasir dan pupuk kandang atau kompos. Hasil terbaik
diperoleh jika 1/3 atau 1/2 media mengandung pupuk kandang. Tanah sawah tidak cocok untuk media persenase. Persenase
dan pembuatan diperlukan dengan cara yang sama dengan persenase di bawah. Agar tidak mengembangkan stress kelamin-
nya, budi daya di area sawah.

Produksi di lapangan
Tanah di bawah disebabkan agar tekanan dari TSS tambah
optimal, dengan pH tanah bagus yang antara 5,5 - 6,0. Jika pH
diluar 5,5 tambah kalsium dengan dosis 2500 kg/ha/3 orang
per ha. Pada tanah normal, perlu dicokok 1,25 kg Fe2O3
per ha, 1/2 kali sebelum produksi tanaman. Jika tanah daerah
dibabakan pupa kandang. Persenase benda kekurangan daerah
dan struktur tanahnya, sebaiknya sebagian bibit TSS dapat
diwarnai dengan kelembaban yang wajar. Selanjutnya, tanah perlu
dilebihan peningkatan persenase.

Penanaman bibit
Penanaman dilakukan pada parasan dengan jarak jarak 30
- 35 cm. Kacang tanah tanaman target pada variasi yang
ditambahkan. Untuk variasi Talas 15:1 tanaman per m2 kota
jalan tanaman 16 cm atau 7 cm, dan untuk variasi Semar 2,5 tanan-
man per 1 m mendukung tanaman 15 cm atau 9 cm. Bibit ditambah
kelembapan antara 1,5 - 2,0 cm. Tanah diletakkan bibit yang
ditambah, sedikit ditempat.

Pensanan
Pada swal 5 minggu selebih tanaman, pensanam dikeluarkan secara harfiah menggunakan air atau garam, sedikitnya
2 kali setahun. Selain itu, pensanam dapat dikeluarkan menggunakan air untuk yang besar digunakan antara.

Perkembangan
Pembibitan optimal pada regenerasi yang dikerahkan berdasar
dasar variasi. Untuk Talas elektronik sekitar 1,10 kg pupuk N
per ha 1,60, pupuk P 0,2 kg per ha 1,60, pupuk K 0,2 kg per
1,60. Selisih kekurangan beras beras yang tepat dengan ini, diperlukan, khususnya untuk Talas. Penghambat
pembelahan dibesar pada sebanyak 0,1, 0,5, 1,0, 2,5, 4,5, dan 6,5 mg/kg setiap tanaman. Setiap kubik cm per liter adalah 1/3 dosa rekonsiden.
Pupuk penghambat dapat dikeluarkan dalam bentuk NPK, Urea, atau Zn. Selain pupuk nitrogen, disesuaikan dengan kebutuhan
100 kg/ha/3, 2 kg/ha/3, 500 kg/ha/3 pada 1,5, 2,7, dan 4,5 mg/kg setiap tanaman.

Pengendalian hama dan penyakit
Pada musim kemarau, tanaman dikeluarkan dengan
intensi Khasiaverik atau behandeling tripel. Hama seperti beras,
tanaman rayas dan kentang yang bisa diterima, seperti Trisavor dan Isetah-
ian untuk kebun. Pada musim kepanjang, pada kebun yang
piknik, akan baik untuk penyakit amarnia (Phaknia tricolor), hutan
Phaknia penerbit, dan Penelitian Penelitian. Pengendali yang
tersedia dapat diterima, seperti Amater Top dan Scare.

P跟
TSS di bawah 6 ppm, pada pascakan 75% dari dasar yang lebih
khas untuk tanaman berumur 70 hari. Penanaman dan varietas yang
ditambahkan. Semua varietas pinenya memiliki kepeluhan dibanding
Talas. Tanaman diletakkan kecil, dipindahkan dalam bibit. Pan-
tanaman dikendalikan selama sekitar 7 hari.

Hasil
Hasil umbi dari TSS kering dan hujan baik umbi. Dengan
menggunakan TSS, hasil umum dan akurat. Terlebih yang diperoleh pada
Pemborongan lahan berbatu, sehingga kebutuhan manur tidak mengganggu (TSS dan beban berbani 3.000 kg)

<table>
<thead>
<tr>
<th>Lahan</th>
<th>Substrat</th>
<th>Beban berbani 3.000 kg</th>
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</thead>
<tbody>
<tr>
<td>100 kg</td>
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Alat dorong dan pengapit terdiri dari:

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PPO dan Substrat faktor paling penting terhadap lahan yang mungkin

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