



HORTIN II Co Innovation Programme

Towards cost effective, high quality value chains

Report on dissemination activities during the hot pepper research

HORTIN-II Research Report nr. 26

Witono Adiyoga and Herman de Putter

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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.

Addresses:

Indonesian Centre for Horticultural Research and Development (ICHORD)

Address : Jl. Ragunan 29A, Pasarmingu, Jakarta 12520, Indonesia
Tel. : +62 21 7890990
Fax : +62 21 7805135
E-mail : pushor@rad.net.id or pushorti@yahoo.com
Internet : www.litbanghortikultura.go.id

Indonesian Vegetable Research Institute (IVEGRI)

Address : Jl. Tangkuban Perahu 517, Lembang-Bandung 40391, West Java, Indonesia
Tel. : +62 22 2786 245
Fax : +62 22 2786 416
E-mail : dir_ivegri@balitsa.org or balitsa@balitsa.org
Internet : www.balitsa.org

Indonesian Centre for Agricultural Postharvest Research and Development (ICAPRD)

Address : Kampus Penelitian Pertanian, Cimanggu, Bogor 16114, West Java, Indonesia
Tel. : + 62 251 321762
Fax : + 62 251 350920
E-mail : bb_pascapanen@litbang.deptan.go.id or bb_pascapanen@yahoo.com
Internet : www.pascapanen.litbang.deptan.go.id

Agricultural Economics Research Institute (AEI)

Address : Alexanderveld 5, Den Haag, The Netherlands
: PO Box 29703, 2502 LS Den Haag, The Netherlands
Tel. : +31 70 335 83 30
Fax : +31 70 361 56 24
E-mail : informatie.lei@wur.nl
Internet : www.lei.wur.nl

Agrotechnology and Food Sciences Group (ASFG)

Address : Building 118, Bornsesteeg 59, Wageningen, The Netherlands
: PO Box 17, 6700 AA, Wageningen, The Netherlands
Tel. : +31 317 480 084
Fax : +31 317 483 011
E-mail : info.asfg@wur.nl
Internet : www.asfg.wur.nl

Applied Plant Research (APR)

AGV Research Unit

Address : Edelhertweg 1, Lelystad, The Netherlands
: PO Box 430, 8200 AK Lelystad, The Netherlands
Tel. : +31 320 29 11 11
Fax : +31 320 23 04 79
E-mail : infoagv.ppo@wur.nl
Internet : www.ppo.wur.nl

WUR-Greenhouse Horticulture (WUR-GH)

Address : Violierenweg 1, Bleiswijk, The Netherlands
: PO Box 20, 2665 ZG Bleiswijk, The Netherlands
Tel. : +31 317 48 56 06
Fax : +31 10 52 25 193
E-mail : glastuinbouw@wur.nl
Internet : www.glastuinbouw.wur.nl

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Programme Team

	Indonesia	The Netherlands
Programme management	Dr. Yusdar Hilman, Director ICHORD Telephone +62 21 7890990 Fax +62 21 7805135 E-mail: YHILMAN@INDO.NET.ID	Dr. Arij Everaarts, APR, General management Telephone +31 320 291 671 Fax +31 320 230 479 E-mail: ARIJ.EVERAARTS@WUR.NL Mrs. Myrtille Danse, AEI, Supply Chain Management
Sweet pepper pilot project	Dr. Nikardi Gunadi, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: NGUNADI@BDG.CENTRIN.NET.ID	Mrs. Marieke van der Staaij, Ruud Maaswinkel, WUR-Greenhouse Horticulture Telephone +31 317 485 537 Fax +31 105 225 193 E-mail: MARIEKE.VANDERSTAAIJ@WUR.NL RUUD.MAASWINKEL@WUR.NL
Shallot pilot project	Dr. Rofik Sinung Basuki, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: ROFIK@HOTMAIL.COM	Lubbert van den Brink, APR Telephone +31 320 291 353 Fax +31 320 230 479 E-mail: LUBBERT.VANDENBRINK@WUR.NL
Hot pepper pilot project	Dr. Witono Adiyoga, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: VICIANTI@YAHOO.CO.ID	Herman de Putter, APR Telephone +31 320 291 614 Fax: +31 320 230 479 E-mail: HERMAN.DEPUTTER@WUR.NL
Supply chain management	Dr. Witono Adiyoga, Dr. Nikardi Gunadi, Dr. Rofik Sinung Basuki, IVEGRI	Mrs. Myrtille Danse, Mrs. Rolien Wiersinga, Dr. Dave Boselie, AEI Telephone +31 70 3358 341 Fax +31 70 3615 624 E-mail: MYRTILLE.DANSE@WUR.NL ROLIEN.WIERSINGA@WUR.NL DAVE.BOSELIE@WUR.NL
Quantitative Economic Analysis	Dr. Witono Adiyoga, IVEGRI	Marcel van der Voort, APR Telephone +31 320 291 312 Fax +31 320 230 479 E-mail: MARCEL.VANDERVOORT@WUR.NL
Fruit supply chains	Dr. Sri Yuliani, ICAPRD Telephone +62 251 321762 Fax +62 251 350920 E-mail: S.YULIANI@GMAIL.COM	Dr. Jeroen Knol, ASFG Telephone +31 317 480177 Fax +31 317 483011 E-mail: JEROEN.KNOL@WUR.NL

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Executive summary

During the research activities of hot pepper several formal and informal meetings with the farmers were organized. These meetings functioned in the first place to disseminate results of the research to the farmers. Secondly the meetings were used to receive feedback of the farmers on the research topics and to formulate together new topics.

Different forms of meetings were organized, formal workshops with presentations to informal meetings with open discussion on the field.

Not all meetings are described in this report and only the results of the more formal meetings are presented.

With the activities farmers' knowledge about new techniques to improve hot pepper cultivation has been increased. Knowledge has not only be improved by presenting the results of the research activities but has also been increased due to the fact that during the meetings farmers could exchange information.

1. Introduction

The main concern in the technology transfer process is how to effectively disseminate new technology considering the viewpoint of farmers. Hence, the questions of where, how, and what technologies are appropriate and available to them have absolutely to be addressed. While many farmers know the nature of their problems in the field, research and extension workers should also have good insights regarding their socio-economic conditions. This may enhance the possibilities for them in adopting technologies and pursuing technological solutions to their problems.

Methods

Dissemination is a communication process between sender and receiver. Being mainly communication process, it requires efficient communication process (Adeokun et al., 2006). According to Rogers et al. (1998), communication is a process that involves the exchange of ideas between two or more individuals in an attempt to arrive at convergence in meaning. Communication is a two-way process in which the sender and receiver of information are seen as active participants who are involved in an exchange process and therefore, swap roles. Within the context of Hortin II – hot pepper, the dissemination methods are directed to result in closer interactions between researcher and farmers for obtaining constructive feedbacks. The dissemination methods used are group discussion, farmers' field visits, seminar and workshops.

2. Dissemination Activities

2.1. Farmers' Group Discussion – Brebes, 14 December 2007

The meeting took place on the field when the 2nd experiment of 2007 was still going on. The discussion took place after farmers had visited the field.

Participants:

Farmers:

1. Surip
2. Subhan
3. Rusmono
4. Mulya
5. Sukar
6. Kardipan

Facilitators:

1. Witono Adiyoga
2. Nikardi Gunadi
3. Herman dePutter
4. Arifin

Notes of discussion:

Seedling raising

- *Direct sowing*

Advantages

- Perceived as more practical and economical (especially, less labor requirement)
- Three to five seeds are sowed per hole. After 3-4 weeks, 1-2 seedlings are kept for edge rows and 1 seedling is kept for middle rows. Taken-out seedlings are used to fill out other empty beds and for re-transplanting.
- First harvest usually can be carried out 7-10 days earlier

Disadvantages:

- Seeds are often flushed down because of raining and watering
- Seeds and emerged seedlings are often eaten by rats
- Percentage of germination is relatively lower, consequently seed requirement is higher
- Seedling quality is relatively poor because the seedlings are directly exposed to pest and disease once they emerge.

- *Seed bed*

Advantages

- Perceived as quite practical and less costly, in terms of materials and seeds required
- Seed emergence is quite uniform and simultaneous
- Humidity and moisture can be kept optimal with less watering

Disadvantages

- It's used to be a common practice for local farmers until five years ago. Farmers stopped practicing this seedling raising system after they experienced high death rate during transplanting (directly transplanted to the field 3-4 weeks after sowing).
- During wet season, soil moisture is often too high and the risk of getting flooded is also quite high

- *Nursery*

Advantages

- Seedlings are protected from small animals, such as crabs and rats
- Pests and diseases incidence can be minimized resulting in more healthy seedlings
- Farmers are quite convinced that this system may provide higher usable and better quality seedlings

Disadvantages

- Investment for nursery construction is considered to be too expensive. Even though this system may produce better quality seedlings, farmers seem quite unwilling to adopt the nursery construction (seed bed nursery is more preferred)
- Additional costs for material and labor have not been proven to be compensated by yield increase
- It's quite space-consuming since the land occupied for the nursery cannot be used for growing the crop. In this case, seed bed nursery is considered to be a more flexible alternative

- *Container*

- Based on their observation, farmers prefer to use transparent plastic bag rather than plastic tray, mainly because they perceive that the former is considered cheaper and more easily to obtain

- *Variety*

- Even though farmers realize that using Astina is going to cost more for them as compared to Tit Segitiga, the interest for its adoption is still there as long as it performs as promised (double the yield of local variety)
- Farmers are not quite impressed with Tanjung 2. This variety is perceived as similar to Tit Lancip that used to be widely grown in the area. It has been no longer used because the fruit has a sharp tip that often broken when packed in a net sack.

Farmers' suggestions for next experiments:

- Farmers suggest to carrying out the main experiment in May-July (transplanting) after rice. It's considered as the main season for hot pepper cultivation in the area. Climatic condition during this period is considered mostly suitable for growing the crop. The yield is usually higher than other planting seasons, however it should be noted that the price risk is also quite high (excess supply). Intercropped with shallot is still recommended.
- Farmers are still expecting more information from the trials for improving planting material. Farmers seem to agree for putting more attention to the use of transparent plastic bag and manure + top soil media, including the use of hybrid varieties (considering a continuing yield decrease of local varieties). Farmers also ask for more elaboration to the seed bed nursery.
- Farmers still perceive that significant yield difference is still the best indicator to measure the technology performance. This implies that the effort for improving planting material should also be followed by some actions for securing the plants in the field.

2.2. Hot Pepper Workshop – Kersana, Brebes, 27 August 2008

After visiting the field in the morning, workshop participants (farmers, extension workers, pest observers, marketing staffs of pesticide companies) were invited into a seminar room in Kersana. Four topics were presented:

- Hortin II – hot pepper research results (Witono Adiyoga)
- Seedling raising (Herman dePutter)
- Hot Pepper's Pest and Disease Identification and Control (Laksmiwati P.)
- Pesticide Spraying Techniques (Tonny K. Moekasan)

Meanwhile, an effective pesticide spraying was also demonstrated by Syngenta Team.

Discussion suggested that farmers were in agreement regarding better quality of planting material resulted from nursery system. Best practice of seedling growing was perceived to be workable. However, they were still questioning whether better quality of planting material could always be transformed into higher yield. Farmers still considered that high production risks in Brebes might not be able to guarantee that the additional yield could compensate the additional investment for adopting the nursery systems. Other important factor that might cause farmer hesitation to adopt nursery systems was the fact that the price of predominantly local hot pepper seed used was very cheap as compared to hybrid seeds. Much higher price of hybrid variety was a disincentive for adoption even though its yield doubled the local OP variety.



Workshop at the seminar room in Kersana.

2.3. Farmers Field Visit – Kersana, Brebes, June 2009

Farmers were invited to visit the field when the 1st experiment of 2009 was still on-going. Eleven farmers were visiting the field and participating actively in assessing the experimental plots. In terms of seedling performance, farmers assessed highest score for transplants coming from plastic tray as compared to those coming from plastic bag and direct seeding. Additional costs for using seedlings were the most important factor that hindered farmers to adopt this technique. Farmers perceived that the plot that performed the best was mono-cropping +

insect net + plastic mulch. However, when they were asked about the suitability of hot pepper mono-cropping system to be applied in Brebes, the rate of agreement was quite low. It seemed that this was somewhat inconsistent with their first response. When clarified, they said that the low agreement was based on the facts that they never had an experience of having good harvest from mono-cropping system and the possibility of farmers for cultivating hot pepper in mono-cropping system under net house was quite unlikely.

Cultivation Systems	Containers			Average
	Direct	Plastic bag	Plastic tray	
Inter-cropping	5.9	5.9	5.9	5.9
Inter-cropping + Insect net			7.9	7.9
Mono-cropping	4.8		5.1	5.0
Mono-cropping + Insect net			7.4	7.4
Mono-cropping + Insect net + Plastic mulch			8.3	8.3
Mono-cropping + Plastic mulch			5.9	5.9
Average	5.3	5.9	6.8	6.3

1 = worst and 10 = best

General assessment regarding the cultivation systems suggested that farmers were in quite high agreement that the use of net house might reduce the risk of hot pepper crop failure; the use plastic mulch might suppress pest incidence; and the performance of Gada (hybrid variety) was much better than Tit Segitiga (OP). Moreover, the highest rate of agreement was stated by farmers to indicate that that these types of research should be further developed because of its great potential to solve hot pepper cultivation problems in Brebes.

	Assessment Scale										Average farmer's assessment	
	1	2	3	4	5	6	7	8	9	10		
	Disagree										Agree	
a.	The use of hot pepper seedlings is much better than direct seeding or direct planting										6.3	
b.	The performance of Gada (hybrid variety) is much better than Tit Segitiga (OP)										7.1	
c.	Mono-cropping planting system is also suitable to be applied in Brebes										5.6	
d.	The use plastic mulch may suppress pest incidence										7.5	
e.	The use of net house may reduce the risk of hot pepper crop failure in Brebes										7.6	
f.	In general, this type of research should be further developed because of its great potential to solve hot pepper cultivation problems in Brebes										7.7	



Instruction on assesment of field treatments to the farmers.



Farmers observations on field treatments

2.4. Farmers Field Visit – Brebes, December 2009

Farmers were invited to visit the field when the 2nd experiment of 2009 was still on-going. Eighteen farmers were visiting the field and participating actively in assessing the experimental plots. In terms of seedling performance, the scores suggested that farmers were quite indifferent with the source of transplant (direct seeding, plastic bag or plastic tray). Farmers perceived that the plot that performed the best was inter-cropping (100 plants/plot) + insect net (Gada); followed by mono-cropping + insect net (Gada); inter-cropping + plastic mulch + insect net (Gada); and inter-cropping + insect net (Gada). This implied the role of insect net, intercropping system and Gada variety in achieving higher yield.

Cultivation Systems	Containers			Aver.
	Direct	Bag	Tray	
Inter-cropping (Tit Segitiga)	6.7	6.6	7.4	6.9
Inter-cropping (Gada)	5.8	5.2	4.7	5.2
Inter-cropping + Insect net (Tit Segitiga)		7.5		7.5
Inter-cropping + Insect net (Gada)	7.8	8.2		8.0
Inter-cropping (100 plants/plot) (Gada)			6.2	6.2
Inter-cropping (100 plants/plot) + Insect net (Gada)			8.6	8.6
Inter-cropping + Plastic mulch (Gada)			5.7	5.7
Inter-cropping + Plastic mulch + Insect net (Gada)			8.1	8.1
Mono-cropping (Gada)			2.9	2.9
Mono-cropping + Insect net (Gada)			8.2	8.2
Mono-cropping + Plastic mulch (Tit Segitiga)			6.4	6.4
Mono-cropping + Plastic mulch (Gada)			6.1	6.1
Mono-cropping + Insect net + Plastic mulch (Tit Segitiga)			6.8	6.8
Mono-cropping + Insect net + Plastic mulch (Gada)			6.3	6.3
Average	6.8	6.9	6.5	

The same general questions regarding cultivation systems were asked to farmers in the 2nd visit. There were some dynamics regarding farmers' responses as compared to the 1st visit.

	Assessment Scale										Average farmer's assessment
	1	2	3	4	5	6	7	8	9	10	
	Disagree									Agree	
a.	The use of hot pepper seedlings is much better than direct seeding or direct planting										7.3
b.	The performance of Gada (hybrid variety) is much better than Tit Segitiga (OP)										6.5
c.	Mono-cropping planting system is also suitable to be applied in Brebes										3.6
d.	The use plastic mulch may suppress pest incidence										6.3
e.	The use of net house may reduce the risk of hot pepper crop failure in Brebes										8.7
f.	In general, this type of research should be further developed because of its great potential to solve hot pepper cultivation problems in Brebes										9.3

Higher degree of agreement as compared to the 1st visit responses was stated by farmers in regard to the use of hot pepper seedlings is much better than direct seeding or direct planting; the use of net house may reduce the risk of hot pepper crop failure in Brebes; and in general, similar research should be further developed because of its great potential to solve hot pepper cultivation problems in Brebes. Meanwhile, lower degree of agreement as compared to the 1st visit responses was stated by farmers regarding the performance of Gada (hybrid variety)

was much better than Tit Segitiga (OP); mono-cropping planting system was suitable to be applied in Brebes; and the use plastic mulch might suppress pest incidence. The results of the 2nd visit assessment suggested strongly their disagreement regarding the suitability of applying hot pepper mono-cropping system in Brebes.



Observation on cultivation in a net house

2.5. Farmers Field Visit – Brebes, June 2010

Farmers were invited to visit the field when the demo plots of 2010 were still on-going. Sixteen farmers were visiting the field and participating actively in assessing the demo plots. Farmers perceived that the best quality seedling was resulted from plastic bag containers. It was also indicated that seedlings from plastic bag were even performing better than seedlings from direct sowing. The worst seedling performance was indicated from that grown in tray-128, even though slight improvement was shown when the seedlings were removed into plastic bag – 10 cm container two weeks after sowing.

General impression of the seedlings: 1=very good ; 9=very poor

Variety	Container					mean
	direct	plastic bag	tray128	tray128->10cm	tray70	
Gada	3.6	2.2	5.8	5.2	4.4	4.2
Tit S	3.5	1.8	5.7	5.0	5.6	4.5
mean	3.5	2.1	5.7	5.1	4.6	4.3

Direct sowing was still considered as the cheapest method by farmers.

Estimated cost for this particular method: 1=low; 9=high

Variety	Container					mean
	direct	plastic bag	tray128	tray128->10cm	tray70	
Gada	3.5	4.3	6.8	5.6	6.5	5.8
Tit S	3.4	4.9	6.6	5.5	6.7	5.5
mean	3.5	4.5	6.7	5.6	6.6	5.7

This was subsequently followed by plastic bag and plastic tray. It was quite surprising though that farmer perceived the use of tray-124 was less expensive than the use of tray-128 + plastic bag 10 cm. Farmers seemed unaware that the latter needed more labor and material. Thus, the use of tray-128 + plastic bag 10 cm was supposedly more costly.

In terms of its practicality for their own farm, farmers were still perceived that direct sowing was more practical than the use of seedlings.

Assessing practicality for own farm: 1=low; 9=high

Variety	Container					mean
	direct	plastic bag	tray128	tray128->10cm	tray70	
Gada	5.4	5.0	4.4	3.7	4.5	4.6
Tit S	5.3	4.9	4.5	3.7	5.3	4.9
mean	5.4	5.0	4.5	3.7	4.7	4.7

Farmers seemed mostly interested to the use of tray-128 + plastic bag 10 cm. This was quite contradictive with their perceptions of direct sowing as the most practical method they commonly used. Thus, their interest of using tray may only reflect their willingness to try out not to adopt.

Interested to practice in your farm: 1=low; 9=high

Variety	Container					mean
	direct	plastic bag	tray128	tray128->10cm	tray70	
Gada	5.8	6.4	5.1	3.6	4.8	5.1
Tit S	6.7	5.7	4.7	3.4	4.8	5.2
mean	6.2	6.2	4.9	3.5	4.8	5.1

2.6. Farmers Workshop – Brebes, August 2010

A workshop mainly for demonstrating the practice of growing seedlings in nursery systems was carried out in August 2010 for each demo location. The process and materials needed for seedling growing were demonstrated to farmers and after which farmers were asked to assess (a) the general impression of the seedling's performances, (b) estimated growing cost needed, (c) the practicality of sowing methods for their own-farms, and (d) the degree of their interest to try or apply in their own-farms. The number of farmers attending workshop were 17 farmers in Dukuh Tengah; 15 farmers in Kubangpari; and 11 farmers in Kersana. Thus, figures in the following table are the average of farmers' assessments from three demo locations.

Three best sowing methods perceived by farmers were:

1. Gada - tray 70 – top soil+rice husk - 100 mg/l NPK 16-16-16
2. Tit Segitiga - tray 128 – top soil+manure - longer nursery period
3. Gada - tray 128 - top soil+manure - longer nursery period

Three most cost-efficient sowing methods perceived by farmers were:

1. Tit Segitiga – plastic bag – top soil+manure
2. Gada – plastic bag – top soil+manure
3. Tit Segitiga - tray 128 – top soil+manure - longer nursery period

Three most practical sowing methods perceived by farmers were:

1. Gada - tray 70 – top soil+rice husk - 100 mg/l NPK 16-16-16
2. Tit Segitiga - tray 128 – top soil+manure - longer nursery period
3. Gada - tray 70 – top soil+manure

Three sowing methods farmers were interested in:

1. Gada - tray 70 – top soil+rice husk - 100 mg/l NPK 16-16-16
2. Tit Segitiga - tray 128 – top soil+manure - longer nursery period
3. Gada – plastic bag – top soil+manure

Farmers impression of the treatments.

Var	Containr	Media	Additional remarks	General impression (1 =very poor; 5 = very good)	Estimated cost (1 = very expensive; 5 = very cheap)	Practicality (1=very impractical ; 5=very practical)	Interested (1=very un-interested; 5=very interested)
Gada	Tray 70	Ts+M	deep sowing	3.4	2.8	3.1	3.0
Gada	Tray 70	Ts+M	shallow sowng/no cover	2.7	2.9	2.9	2.7
Gada	Plas bag	Ts+M		4.2	3.5	3.1	3.4
Gada	Tray 70	Ts+M		3.4	3.0	3.4	3.2
Gada	Tray 128	Ts+M		2.3	3.0	2.9	2.5
Gada	Tray 70	Ts+M	+ 100 ml Regent 20SC	3.5	2.6	3.0	2.9
Gada	Tray 70	Ts+M	+ Actara schedule	2.9	2.8	3.0	2.8
Gada	Tray 70	Ts+Rh	100 mg/l NPK 16-16-16	4.6	3.0	3.5	3.5
Gada	Tray 70	Ts+Rh	watering with urea	3.9	2.9	3.2	3.3
Gada	Tray 70	Ts+Rh		2.4	3.0	3.1	2.8
Gada	Tray 70	Rh+M		2.9	2.9	3.0	2.7
Gada	Tray 70	Ts+M+Rh		2.9	2.9	2.9	2.8
Gada	Tray 128	Ts+M	longer nursery period	4.4	3.3	3.4	3.4
Tit S.	Tray 70	Ts+M	deep sowing	3.2	3.0	2.9	3.0
Tit S.	Tray 70	Ts+M	shallow sowng/no cover	2.9	2.8	2.9	2.7
Tit S.	Plas bag	Ts+M		4.1	3.7	3.1	3.1
Tit S.	Tray 70	Ts+M		3.3	2.9	2.9	3.0
Tit S.	Tray 128	Ts+M		2.5	3.0	2.7	2.5
Tit S.	Tray 70	Ts+M	+ 100 ml Regent 20SC	2.4	2.4	2.6	2.5
Tit S.	Tray 70	Ts+M	+ Actara schedule	3.2	2.6	2.9	2.8
Tit S.	Tray 70	Ts+Rh	100 mg/l NPK 16-16-16	3.7	2.7	3.1	2.9
Tit S.	Tray 70	Ts+Rh	watering with urea	4.2	2.8	3.3	3.1
Tit S.	Tray 70	Ts+Rh		2.6	2.9	3.2	2.6
Tit S.	Tray 70	Rh+M		2.3	3.0	2.7	2.5
Tit S.	Tray 70	Ts+M+Rh		3.2	3.1	3.0	2.9
Tit S.	Tray 128	Ts+M	longer nursery period	4.5	3.4	3.5	3.5
Lettuc	Tray 70	Ts+M		3.7	2.9	3.0	2.8
Caisin	Tray 70	Ts+M		3.2	2.7	2.9	2.5
Eggpla	Tray 70	Ts+M		3.8	2.9	3.3	3.3
Tomat	Tray 70	Ts+M		3.9	3.0	3.4	3.1

After assessing the performance of seedlings and sowing methods, farmers were also asked to evaluate 3 months-old crop/plot performance in the field. Here were the 5-best crop/plot performances according to farmers' evaluation. It was noted that all five crops/plots considered the best were those cultivated under net house. This was consistent with the crop conditions in all demo locations during the workshop in which the performance of hot pepper crop cultivated inside net house was much better than that grown in open-field.

Five best plots perceived by farmers were:

1. Gada – seedling grown in tray 70 – grown in net house – in the nursery Regent and NPK were added (less fertilizer in the field)
2. Gada - seedling grown in plastic bag - grown in net house
3. Tit Segitiga - seedling grown in plastic bag - grown in net house
4. Tit Segitiga - seedling grown in tray 70 – grown in net house
5. Tit Segitiga - direct planting - grown in net house

Farmers' impressions on general crop/plot performance: (1 = very poor; 5 = very good)

			Dukuh T	Kubang P	Kersana	Average
Gada	Direct	yes	4.2	4.3	3.6	4.0
Gada	Tray 70	yes	4.0	4.3	2.9	3.7
Gada	Tray 70	yes	3.4	2.9	4.7	3.7
Gada	Tray 70	yes	3.9	4.8	4.8	4.5
Gada	Tray 128	yes	2.2	4.7	3.1	3.4
Gada	Pls bag	yes	4.3	4.6	3.9	4.3
Tit S	Direct	yes	4.2	4.6	3.6	4.1
Tit S	Tray 70	yes	4.1	4.9	3.6	4.2
Tit S	Tray 128	yes	4.1	4.0	3.7	3.9
Tit S	Pls bag	yes	4.5	4.6	3.6	4.3
Tomato- Caisim	Tray 70 – Tray 128	yes	2.3	2.0	1.5	1.9
Eggplant -	Tray 70 –	yes	3.6	4.1	4.1	4.0
Lettuce	Tray 70		3.3	2.4	3.0	2.9
Gada	Direct	no	2.3	3.5	3.2	3.0
Gada	Tray 70	no	3.1	1.9	2.9	2.7
Gada	Tray 70	no	3.5	3.3	3.8	3.5
Gada	Tray 70	no	3.4	3.7	3.9	3.7
Gada	Tray 128	no	2.8	2.5	3.0	2.7
Gada	Pls bag	no	2.1	3.5	1.9	2.5
Gada	Tray 128	no	2.6	2.9	2.4	2.6
Gada	Tray 70	no	1.8	1.3	2.3	1.8
Tit S	Direct	no	3.7	3.7	4.2	3.9
Tit S	Tray 70	no	3.7	3.9	3.3	3.6
Tit S	Tray 128	no	3.8	3.5	2.9	3.4
Tit S	Tray 128	no	3.6	4.0	3.8	3.8



Observation on different raising methods



Demonstration on using different components for media making

5. Conclusion

1. Dissemination activities have increased farmers' knowledge regarding some possibilities of improving their hot pepper cultivation. However, increased farmers' knowledge does not always guarantee speedy adoption. Both technical and non-technical factors under their production circumstances will affect the decision to try out and finally to adopt.
2. Farmers are already aware of the benefits in using seedlings: (a) increasing seed-use efficiency, (b) having more healthy young plants, and (c) preventing young plants from direct exposure to pests and diseases at least 30 days longer. However, they argued that the first benefit was not quite relevant to their condition, since none of them were using hybrid seed. For the second and third benefit, they were also quite skeptical, since the transplants have not shown better performance in the field as compared to commonly practiced direct planting, except when the seedlings are cultivated in net house.
3. Additional cost (material and labor) for using seedlings was also an issue raised by farmers. This might be the most significant factor that hindered farmers to adopt the practice. At this stage, their preference was still direct planting, because they were still not quite sure that the increase in yield (revenue) in open-field cultivation might compensate the increase in cost of using seedlings. Even the alternative of buying instead of self-producing seedlings did not interest them yet.
4. At later stage, farmers finally assess that Gada performs better than Tit Segitiga. However, since the additional yield of using Gada is still considered insufficient to compensate additional seed cost, it is very unlikely that farmers will replace Tit Segitiga.
5. Some feedbacks resulted from dissemination activities suggest that more studies should be carried out to put the introduction of nursery systems and hybrid varieties within the framework of shallot-hot pepper total/whole-system improvements.

References

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