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*“Strengthening Capacities to Enhance Coordinated and Integrated  
Disaster Risk Reduction Actions and Adaptation to Climate Change  
in Agriculture in the Northern Mountain Regions of Viet Nam”*



**Field Demonstrations on On-Farm Rice Seed Production**

Hanoi, 2011

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## **1. Introduction**

As an economically agricultural country, over 70% of Vietnam total population rely on the agriculture production which is highly exposed to recurring natural hazards, especially in the vulnerable regions, including the northern mountainous. In this region, disasters are occurring with increasingly unprecedented frequencies, severity and scale, causing damages to large crop areas and serious losses in term of human lives, properties and ecological environment.

Under this project, with financial support provided by FAO, NOMAFSI has conducted a baseline situation analysis study and documentation of good practices relating to disaster risk management (DRM) and climate change adaptation (CCA) in the target areas. One of the study important findings is that farming communities currently depend on external suppliers for rice seeds, and thus often face problems caused by poor seed quality, untimely seed supply, especially when extra volumes are required for restoring rice production after natural disasters. Another important finding is that there are traditional agricultural practices of high value for mitigating impacts abiotic stresses, especially for recovery of crop production after disasters and for adaptive to climate agriculture. Most noteworthy are the use of diverse pureline rice varieties with good adaptability to local growth conditions, and practice of on-farm production and distribution of pureline rice seeds. It was recorded that older farmers have good knowledge and skills in the production and storage of conventional rice seeds. In the "old days", particularly during 1960-1980, most communities were self-sufficient in rice seeds: each agricultural cooperative established a rice seed production group comprising most experienced and skillful farmers, who are in charge of the production of rice seeds for the whole cooperative.

In order to develop and disseminate for effective and wide application of good traditional agricultural practices for DRM and CCA, based on the traditional knowledge in on-farm rice seed production, NOMAFSI has developed advanced technology for on-farm rice seed production using RICM (rice crop integrated management). Together with training of farmers and local cadres in related issues, the institute has conducted demonstrations in all the 6 communes in the project's 3 target provinces, including:

1. Dai Phac commune of Van Yen district, Yen Bai province
2. Yen Binh commune of Yen Binh district, Yen Bai province
3. Son Hai commune of Bao Thang district, Lao Cai province
4. Muong Vi commune of Bat Xat district, Lao Cai province
5. Minh Hac commune of Ha Hoa district, Phu Tho province
6. Chan Mong commune of Doan Hung district, Phu Tho province

Following are results of the field demonstrations conducted under the project in 2010 and 2011.

## 2. Demonstration models developed

Due to the time limit (the LOA was signed late in 2010, while in Muong Vi commune of Bat Xat district, Lao Cai province, spring rice crop season started earlier) in Muong Vi commune the demonstration was conducted in 2010 summer crop and in 2011 spring crop. In all the rest 5 communes, demonstrations were conducted in the 2 rice seasons in 2010: spring and summer. Selected farming households with appropriate capacity, and land and labour resources were selected to build the demonstration models with the project supports. The results are briefly presented in Table 1, 2 and 3.

### 2.1 Demonstrations in the spring crop of 2010

In the spring crop of 2010, a total of 83 households were selected to develop the demonstration models using different pure-line rice varieties appropriate for the local growth conditions and proffered by local farmers (table 1). As seen in the table 1, all the pure-line rice varieties expressed good growth and gave good yield. In all the locations, with the project supports, farmers could practice techniques offered by the project to produce quality rice seeds from foundation seeds. The ratio of quality rice seeds from the total rice grain amount obtained was high in all sites.

Seeds produced in the spring crop were partly used by the producers and their neighbours for commercial rice production in the next season, and partly used for food.

**Table 1: Demonstration models developed in 2010 spring rice crop season**

Commune	Rice varieties <sup>(*)</sup>	No. of households	Total area (ha)	Yield (t/ha)	Quality seed produced (t)
Đại Phác	Chiêm Hương	19	1.0	6.7	6,5
Yên Bình	TL6	18	1.0	5.9	5,7
Sơn Hải	HT1	10	1.0	4.3	4,0
Minh Hạc	BT13, KD18	16	0.5	6.2	3,0
			0.5	5.3	2,5
Chân Mộng	SH14, BT13	20	0.5	5.7	2,8
			0.5	6.0	2,7
<b>TOTAL</b>		<b>83</b>	<b>5,0</b>		<b>27.0</b>

(\*): Foundation seeds were provided by NOMAFSI

### 2.2 Demonstrations in the summer crop of 2010

In the summer crop season, 77 households were supported by the project to produce rice seeds of pure-line varieties in their fields. As in the spring crop season, all the varieties expressed good growth and gave good yield. In all the locations farmers could produce quality seeds from foundation seeds provided by NOMAFSI. The ratio of quality rice seeds from the total rice grain amount obtained was also high in all sites (Table 2).

**Table 2: Demonstration models developed in 2010 summer rice crop season**

Commune	Rice varieties <sup>(*)</sup>	No. of households	Total area (ha)	Yield (t/ha)	Quality seed produced (t)
Đại Phác	Chiêm Hương	10	1.0	5.7	5.5
Yên Bình	TL6	12	1.0	5.2	5.0
Sơn Hải	HT1	9	1.0	4.5	0 <sup>(**)</sup>
Mường Vi	Séng Cù	10	1.0	5.5	0 <sup>(**)</sup>
Minh Hạc	BT13	16	1.0	5.3	5.0
Chân Mộng	T10	20	1.0	5.3	5.0
<b>TOTAL</b>		<b>77</b>	<b>6,0</b>		<b>28.5</b>

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(\*): *Foundation seeds were provided by NOMAFSI*

(\*\*): *Due to the long lasting rains in Son Hai and Muong Vi, rice grains harvested from these two communes' models could not meet the requirement of certified seeds, despite that before the rains all the stakeholders acknowledged their good quality.*

### **2.3 Demonstrations in the summer crop of 2010**

As in the previous season, in the summer crop of 2010, the selected 10 households continued to be supported to produce seed of the local specialty variety Seng Cu (Table 3). As seen, the yield of rice was high, as as observed by farmers and local cadres rice seeds are with good quality.

**Table 3: Demonstration models developed in 2011spring rice crop season**

<b>Commune</b>	<b>Rice varieties<sup>(*)</sup></b>	<b>No. of households</b>	<b>Total area (ha)</b>	<b>Yield (t/ha)</b>	<b>Quality seed produced (t)</b>
Muong Vi	Séng Cù	10	1	6,5	6,2
<b>Sum</b>			<b>1</b>		<b>6,5</b>

(\*): *Foundation seeds were provided by NOMAFSI*

**Table 4: Economic benefits of on-farm production of rice seed, calculated for 1 ha in the spring crop season**

<b>a. Including the labour cost in the production cost (vnd 1,000)</b>								
Sites	Rice variety	Total return		Net income <sup>(**)</sup>		Additional input for seed production model <sup>(*)</sup>	Additional net income from seed production model	Additional net income from additional VND 1,000 spent for seed production model
		Rice production for food	Rice seed production model	Rice production for food	Seed rice production model			
		(1)	(2)	(3)	(4)	(5)	(6) = (4) - (3)	(7) = (6) : (5)
Đại Phác	Chiêm Hương	36,850	53,625	1,130	15,805	2,100	14,675	6,988
Yên Bình	TL6	41,300	59,850	5,580	22,030	2,100	16,450	7,833
Sơn Hải	HT1	30,100	42,000	-5,620	4,180	2,100	9,800	4,666
Minh Hạc	BT13	31,000	45,000	-4,720	7,180	2,100	11,900	5,666
	KD18	26,500	37,500	-9,220	-0,320	2,100	8,900	4,238
Chân Mộng	SH14	28,500	42,000	-7,220	4,180	2,100	11,400	5,428
	BT13	30,000	40,500	-5,720	2,680	2,100	8,400	4,000

<b>b. Excluding the labour cost from the production cost (vnd 1,000)</b>						
Sites	Rice variety	Total return		Net income <sup>(**)</sup>		Increase in net income from seed production model
		Rice production for food	Rice seed production model	Rice production for food	Rice seed production model	
		(1)	(2)	(3)	(4)	(5) = (4) - (3)
Đại Phác	Chiêm Hương	36,850	53,625	25,630	42,405	16,775
Yên Bình	TL6	41,300	59,850	30,080	48,630	18,550
Sơn Hải	HT1	30,100	42,000	18,880	30,780	11,900
Minh Hạc	BT13	31,000	45,000	19,780	33,780	14,000
	KD18	26,500	37,500	15,280	26,280	11,000
Chân Mộng	SH14	28,500	42,000	17,280	30,780	13,500
	BT13	30,000	40,500	18,780	29,280	10,500

(\*): Attributed to higher labour input spent for plant management (purification, weeding, transplanting...). When labour cost is excluded, the production material input cost was the same for production of rice for food and for production of seed rice. The material input cost VND 11,220 for 1 hectare. The labour cost was VND 24,500 for production of rice for food, and VND 26,600 for seed production.

(\*\*): Net income (NI):  $NI = TR$  (total return) -  $TE$  (total production expenses)

Farmers exchange seed rice among communities at the rate: 1.5 (1 kg seed rice get 1.5 kg of rice for food)

Price of rice (for food): Of variety Sheng Cu: 8.000 - 8.5000 vnd/kg

Of variety TL6: 6.500 - 7.000 vnd/kg

Of variety KD18: 4.500 - 5.000 vnd/kg

Of other varieties: 5.000 - 5.500 vnd/kg

(the price used in the calculations was of rice right after the harvest time).

**Table 5: Economic benefit of rice seed production in comparison to commercial rice production (summer crop season, 2010)**

<b>a. Including the labour cost in the production cost (vnd 1,000)</b>								
Sites	Rice variety	Total return		Net income (**)		Additional input for seed production model <sup>(*)</sup>	Additional net income from seed production model	Additional net income from additional VND 1,000 spent for seed production model
		Rice production for food	Rice production for seed	Rice production for food	Rice production for seed			
		(1)	(2)	(3)	(4)			
Đại Phác	Chiêm Hương	39,900	55,250	4,180	17,430	2,100	13,250	6,310
Yên Bình	TL6	41,600	68,400	5,880	30,580	2,100	24,700	11,762
Sơn Hải	HT1	30,100	37,500	-5,620	-0,320	2,100	5,300	2,524
Mường Vi	Shéng cù	40,500	62,300	4,780	24,480	2,100	19,700	9,381
Minh Hạc	BT13	31,800	37,500	-3,920	-0,320	2,100	3,600	1,714
Chân Mộng	T10	37,100	58,800	1,380	20,980	2,100	19,600	9,333

<b>b. Excluding the labour cost from the production cost (vnd 1,000)</b>						
Sites	Rice variety	Total return		Net income(**)		Increase in net income from seed production model
		Rice production for food	Rice seed production model	Rice production for food	Rice seed production model	
		(1)	(2)	(3)	(4)	
Đại Phác	Chiêm Hương	39,900	55,250	28,680	44,030	15,350
Yên Bình	TL6	41,600	68,400	30,380	57,180	26,800
Sơn Hải	HT1	30,100	37,500	18,880	26,280	7,400
Mường Vi	Shéng cù	40,500	62,300	29,280	51,080	21,800
Minh Hạc	BT13	31,800	37,500	20,580	26,280	5,700
Chân Mộng	T10	37,100	58,800	25,880	47,580	21,700

(\*): Attributed to higher labour input spent for plant management (purification, weeding, transplanting...). When labour cost is excluded, the production material input cost was the same for production of rice for food and for production of seed rice. The material input cost VND 11,220 for 1 hectare. The labour cost was VND 24,500 for production of rice for food, and VND 26,600 for seed production.

(\*\*): Net income (NI):  $NI = TR$  (total return) -  $TE$  (total production expenses)

Farmers exchange seed rice among communities at the rate: 1.5 (1 kg seed rice get 1.5 kg of rice for food)

Price of rice (for food): Of variety Sheng Cu: 8.000 - 8.5000 vnd/kg

Of variety TL6: 6.500 - 7.000 vnd/kg

Of variety KD18: 4.500 - 5.000 vnd/kg

Of other varieties: 5.000 - 5.500 vnd/kg (the price used in the calculations was of rice right after the harvest time).

On the other hand, through building the demonstration models and delivering trainings, the project team promoted the use of local traditional rice varieties, such as Seng Cu and Chiem Huong, and newly developed pure-line ones with desirable traits, including TL6, HT1, BT 13 and T10. As seen in Table 4 and Table 5, these varieties brought growers higher economic benefits. Most beneficial was TL6 followed by Sheng Cu, Chiem Huong and T10.

### 3. General evaluation

As observed by farmers, the techniques applied by the project is appropriate for their application. All the selected households could fruitfully practice the technology delivered by the project, and gained good yield of rice.

According to all the stakeholders, including farmers, local officials, local staff, project team and project technical advisor, rice seeds produced under the demonstrations were with good quality. Particularly, in Dai Phac and Yen Binh (Yen Bai province), in the summer season, the project provided support to only 1 hectare in each commune (22 households in total), but farmers proactively practiced techniques in more than 10 hectares.

Rice seeds produced in the 2010 summer crop have different fates:

- Seeds produced in Dai Phac was purchased by Yen Bai Seed Company.
- Seeds produced in Yen Binh were collected by Yen Binh district Extension Station for use in the district extension activities in the next rice season.
- Seeds produced in other communes are being stored by the households and will be used in the next cropping season within the communities.

In Dai Phac, the project also provided the farmers group with a seed cleaning and sorting machine to help them process rice seeds after the harvest. Farmers group in this commune was acknowledged as the best among the 6 communes in term of the group's organization and linkage with other stakeholders. This commune was also considered as the most successful one in term of community-rice seed production and supply. This was because, in this commune, NOMAFSI, since 2007, with support from FAO under the project TCP/VIE/3101 aiming at improved seed source quality and rice production for food security in the midland and mountainous regions of Viet Nam, has trained and assisted selected farmers to practice on-farm rice seed production. Its rice seed production group currently consists of 20 members, working under the leadership of the group management unit comprising 3 people and in accordance to the group regulations. Dai Phac commune's rice seed production group however has not been officially formed and recognized by any organization with legal entity. And, although the group members are capable to produce seeds of high quality, there are still many issues to be solved/improved for its effective and sustainable operation. The most important questions to answer are as below:

- How to get rice seeds certified and sold at reasonable prices?
- What is the role of different stakeholders (group members, group leaders, commune's people committee, local seed centers/companies, etc.)
- How to develop the value chain for on-farm produced rice seeds?

Table 3 and 4 summarize the cost-effectiveness of the models built in the 6 communes in the last 2 crop seasons of 2010. As seen, in all the 6 communes, the models of rice seed production could bring better economic benefits to farmers compared to the production of rice for food. The production material input cost was VND 11,220 per hectare, and was the same for both production purposes (production of rice for food and for production of rice for seed).

**When the labour cost was included in the production input** (Table 4a & 5a), in general, rice production for use as food did not bring significant economic benefits to growers; for most varieties, the net income was negative, i.e. the total return was less than the total production cost. However, seed rice production models could still brought economic benefits to farmers, except for rice variety KD18 of which the rice price was

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lowest. The increase in net income from the seed production models ranged from VND 8,400 - 16,450 per hectare, depending on the variety of rice. When applied the techniques offered by the project, for each additional VND 1,000 of labour input, farmers could get a net income of VND 4,000 - 9,000 (for spring crop season) and of VND 2,000 - 11,000 (summer season), depending on the variety of rice. The highest profits was that of TL6, followed by Chiem Huong, BT13 etc. Thus, for each 1 additional working day spent for applying the techniques of rice seed production, farmers could get VND 150,000 - 600,000 in return.

**When the labour cost was excluded** (Table 4b & 5b), for all the varieties and for both cases, seed production models and production of rice for food, growers earned economic benefits. As seen, both the total return and net income from the seed production models were higher compared to the production of rice for food. Depending on the rice varieties, the increase in net income from seed production models was VND 10,000 - 18,550 (for spring crop) and 5,700 - 26,800 (for summer crop). The highest increase was recorded for TL6, Sheng Cu and Chiem Huong.

Together with establishing demonstration models, trainings were organized for farmers and local cadres in quality seed production of pure-line rice varieties, in the following aspects (the training materials are as in the annex attached):

- Seedling production and transplanting
- Rice field management
- Purification, harvest and post harvest

The trainings were delivered using farmer field schools (FFS), and thus trainees could easily understand and apply technologies. Most farmers attended the trainings could effectively practice necessary techniques for seed preparation and treatment, sowing, transplanting, water management, fertilization, purification, weeding, pest control, harvest and postharvest. This was expressed in the high yield of good quality rice seeds of the model fields. Noteworthy also, some farmer households applied techniques in their paddies without supports from the project. In Dai Phac, for example, the project provided supports to 19 households (in spring season) and 10 households (in summer season) to build demonstration models of rice seed production in the total area of 1 ha (each season). However, some other households also effectively applied the techniques delivered by the project, and could produce quality rice seeds in their fields.

## 4. Conclusions

The application of improved RICM delivered by the project team, the use of pure-line rice varieties with high adaptability to local growth conditions and good quality help communities obtain stable, high rice production and economic benefits, and protect their land and water resources. This in turn contributes greatly to reducing forest destruction for bringing land under the plough and/or for forest products. All these impacts on the forest, land and water resources protection are of important values for DRR.

However, there are still limitations to overcome towards fruitful scaling out of the activities and impacts. The demonstration models although successfully built were not well demonstrated due to the following reasons:

- Limited participation and commitment of communities and other stakeholders. This was mainly because not much input was spent for participatory planning, monitoring and evaluation for local officers, staff and farmers to visit, discuss and evaluate the models.
- The demonstrations were conducted only in 1 or 2 crop seasons, while it often takes a very long time to do the advocacy and to raise awareness and capacity of local authorities and farmers.

As result, in 4 out of the 6 communes, local staff and decision makers did not pay much attention to, and farmers knew little about, the demonstrations. Vice versa, in Yen Bai province, both farmers and authorities at commune, district and provincial levels have been well committed and involved; seeds produced by households in the 2 communes of Yen Bai province were purchased by the Provincial Seed Company or by the District extension Station. This is because since long time before the project started, NOMAFSI has already spent great attempts to improve capacity and awareness for local decision makers and farmers in Yen Bai province in community-based seed production and supply.

Nevertheless, even in Dai Phac the rice seed production group has not been officially formed and recognized by any organization with legal entity. And, although the group members are capable to produce seeds of high quality, there are still many issues to be solved/improved for its effective and sustainable operation. The most important questions to answer are as below:

- How to get rice seeds certified and sold at reasonable prices?
- What is the role of different stakeholders (group members, group leaders, commune's people committee, local seed centers/companies, etc.)
- How to develop the value chain for on-farm produced rice seeds?