

13. Constraints on potato production in West Sumatra

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Introduction

In West Sumatra, a province in Indonesia, potato is an important vegetable crop as food and as a source of income. The area is suitable for potato growing as more than 45 percent of its land is located in highland areas (> 700 m asl). Although potato has been well known and cultivated in the region for many years, its harvested areas and volume of production have not increased significantly. The largest harvested area and the highest production in the last ten years were 2,037 ha and 31,632 t respectively, and in recent years, these have gradually decreased. The figures show that the harvested areas and production are below their potential. This paper describes the constraints of potato production in West Sumatra.

Area, Production and Yield

The average area planted to potato in West Sumatra from 1991 to 2000 was 1,625 ha (Table 1). The potential plantation area is 7,000 ha. The distribution of potential potato areas is presented in Table 2, along with information on altitude, rainfall and climate type. The average area where potato was harvested in 1991-2000 was 1,591 ha. This means that an average of 34 ha or 2.09 percent of the total area planted was not harvested or had no yield. The primary cause was disease infestation. Potato production in 1991-2000 varied from 17,763 t to 31,632 t. The highest production was recorded in 1994.

Average potato yield in West Sumatra in 1991-1999 was 15.4 t/ha (Table 1) (BPS Sumbar 1995 and 1999). But Buharman (2000), from his survey, found that the yield average was only 10.4 t/ha, which was much less than the potential yield of 30.0 t/ha. Granola is the dominant variety planted to more than 95 percent of the potato area.

Production Constraints

Lack and high price of good quality seeds

Most farmers in West Sumatra produce their own planting materials. They sell the big-sized potatoes and keep the medium-sized ones for planting. These are usually not of good quality and their average generation is not known. A small amount of seed comes from Brastagi, North Sumatra and these are usually of poor quality and of unknown generation. Some relatively good seed is imported from Java but they are expensive so only a few farmers could buy them.

There have been several programs and activities to improve seed supply involving several institutions. For example, in 1996, the Solok District Government supplied good seeds for farmers to plant 15 hectares. After harvest, the farmers were supposed to sell their seeds to other farmers and repay the government in cash equivalent to the price of the seeds they received, which would then be used buy new seed. Another example is the PT Taruko Bumi Solinda, a relatively big company which tried to produce good potato seeds since 1998. It

ordered plantlets from IPB, Bogor and built 60 screenhouses for seed production. Unfortunately, these ventures did not succeed.

Fertilizer application

Alahan Panjang is the center of potato cultivation in West Sumatra, accounting for about 80% of production. The soil type in the area is Inceptisol, which is relatively fertile. However, farmers apply too much fertilizer, which becomes disadvantageous in the long run. In the dry season of 1995, farmers applied an average of 1,999 kg/ha of fertilizer (BPTP Sukarami 1997). In 1999, they applied an average of 1,586 kg/ha (Buharman 2000). Fertilizers applied by farmers consisted of urea, ammonium sulfate, superphosphate 36, NPK, and potassium chloride (KCl). Farmers typically apply fertilizer on the surface of the soil near the plants because they think it is less costly compared with mixing fertilizers into the soil. This application method makes fertilizers less effective, however.

Organic manure is needed for high seed production in West Sumatra. Unfortunately, most farmers applied less than 5 t/ha, and some, none at all. At present, the price of organic manure in potato production centers is relatively high (Rp 6,000/kg). This does not include transport costs.

Pest management

Several diseases and insect pests often seriously damage potato. The important ones in West Sumatra are late blight (*Phytophthora infestans*), bacterial wilt (*Pseudomonas solanacearum*), leafminer fly (*Liriomyza* spp.), potato tuber moth (*Phthorimaea operculella*), and viruses. The most serious potato disease is late blight.

Leafminers caused serious potato infestation in 1996-1998. At present, they still have a relatively high population, but plant mortality has not increased. Table 3 shows the impact of insect pests (leafminer) on yield loss of potato in West Sumatra. To control these insect pests and diseases, farmers applied pesticides intensively, around 2-3 times/week, or around 20 applications/season. Many farmers applied the wrong kind and dosage of pesticides (62.5% sublethal) (Nurdin et al. 1999). This method did not control infestation, was capital-intensive and the produce was not marketable as it contained pesticide residues.

Low acreage

Farmers plant potato in relatively small areas (0.1-0.1 ha), which is not very economical. Farmers did not plant in bigger areas due to lack of capital and fear of failure.

Capital and management skills

Potato cultivation is costly in West Sumatra. Most farmers lack capital, especially in recent years when Indonesia was in recession. Crop and financial management skills of potato farmers are relatively limited. Most farmers grow potato not to maximize net profits, but to avoid risks. Most farmers did not know that having good quality seed is an important factor to realize high yield.

Potato Research and Development

For the last four years the West Sumatra Assessment Institute for Agricultural Technology (WS AIAT) has been conducting several researches on potato. Some of the research activities have been done in collaboration with International Potato Center Regional office in Bogor as well as with Research Institute for Vegetable in Lembang. Some of the results of the research are as following:

- A trial on potato seed quality showed that using G4 seed gave yield 5-7 ton higher than the yield from farmers' seed, which averaged 10 t/ha) (Tanjung and Arizal, 2000).
- An experiment with fertilizer application showed that reducing as much as 50% of fertilizer from farmer practices (totaling 2 t/ha) had no effect on potato yield in Alahan Panjang, West Sumatra (Nurdin et al., 2001)
- A survey in 1997 showed that leafminer flies were distributed over all potato areas in West Sumatra. Five species of parasitoids of *Liriomyza* spp. were found and among them, *Hemiptarsenus huidobrensis* was the dominant species with low degree of parasitism (Nurdin and Setiawati, 2000)
- Screening activities against leafminer flies (*Liriomyza* spp.) showed that potato clone K.419.8 GT, K 432.5 GT, C.387.169-14 and CIP 387.315-15 were relatively resistant against leafminer flies (Nurdin and Setiawati, 2000)

Conclusions

Potato production in West Sumatra has failed to show significant growth as shown by data on harvested areas and production. Farmers faced production constraints such as the shortage and high price of quality seeds, inappropriate fertilizer application and pest management, low acreage, and poor management skills. These constraints must be overcome to develop potato production in West Sumatra. Recently, research activities by the West Sumatra AIAT in collaboration with CIP and RIV was initiated to address some of these constraints.

References

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Table 1. Area planted, production, and yield of potato in West Sumatra, 1991-2000

Year	Planted area (ha)	Harvested area (ha)	Production (t)	Yield (t/ha)
1991	-	1,281	17,763	13.9
1992	-	1,121	17,915	16.0
1993	-	2,037	28,752	14.1
1994	-	2,017	31,632	15.7
1995	1,789	1,722	27,779	16.1
1996	1,782	1,764	29,145	16.5
1997	1,632	1,564	25,535	16.3
1998	1,239	1,250	18,151	14.5
1999	1,683	1,487	23,095	15.5
2000	-	1,665	26,280	15.8
Average	1,625	1,591	24,605	15.4

Source: Bappeda Sumbar (1995 and 2000).

Table 2. Potato development areas in West Sumatra

District/ Subdistrict	Altitude (m asl)	Rainfall (mm/yr)	Climate type	Areas
I. Agam				
1. Baso	1,150	2,912	C2	890
2. Bhp Sei Puar	957	2,237	B1	130
3. IV Koto	825	2,248	B1	950
4. Matur	1,109	2,381	B1	875
II. Datar				
1. X koto	1,243	2,261	B1	295
2. Salimpauang	1,050	2,336	B1	1,050
III. Solok				
1. Lb jaya	1,348	2,490	B1	710
2. Lb gumanti	1,426	2,411	B1	450
Total				5,350

Source: Subdin Bina Produksi Sumbar (2000).

Table 3. Impact of leafminer infestation as perceived by potato farmers in two districts in West Sumatra

Potato yield loss (%)	Solok district (n= 35)	Agam district (n= 30)
10-≤30	11.4	26.7
> 30-≤50	34.3	43.3
> 50-≤70	25.7	16.7
> 70	28.6	13.3

Source: Rauf and Shepard (1999).