JABAL SYSTEM : ITS PERFORMANCE AND POTENTIAL FOR SOYBEAN SEED PROVISION AND AGRI-BUSINESS

Didik Harnowo

Indonesian Legume and Tuber Crops Research Institute (ILETRI)

ABSTRAK

Sistem Jabal adalah suatu sistem informal untuk penyediaan benih terutama untuk benih kacang-kacangan seperti kedelai, kacang tanah dan kacang hijau. Sistem Jabal dapat didefinisikan sebagai sistem distribusi benih dari lapang ke lapang di tingkat petani dan dicirikan oleh adanya rotasi benih dari masa produksi musim hujan pada lahan kering ke masa produksi musim kemarau pada lahan basah (lahan sawah) atau sebaliknya, yang lebih populer dikenal sebagai "Jalinan Benih Antar Lapang dan Musim". Sistem penyediaan benih secara Jabal yang paling umum adalah pada benih kedelai dimana rotasi tanaman sangat cepat dan secara jelas terlihat, baik antar musim dan lokasi (lahan). Karena belum adanya industri benih kedelai formal di Indonesia, sistem jabal dianggap sebagai alternatif bagi penyediaan benih kedelai di Indonesia (umumnya) dan di Jawa Timur (khususnya). Namun demikian, masih terdapat beberapa masalah (kelemahan) di dalam Sistem Jabal, antara lain kemurnian genetik varietas dan kurang tepatnya penanganan pascapanen benih di tingkat petani. Meskipun demikian Sistem Jabal menyimpan potensi untuk peningkatan pendapatan petani atau pedagang pengumpul kedelai melalui *agri-business* kedelai, terutama pada periode awal musim kemarau (bulan Maret-Mei) sebab harga kedelai ("benih kedelai") pada periode tersebut lebih tinggi dibandingkan dengan harga kedelai pada bulan-bulan yang lain disebabkan kebutuhan benih yang sangat banyak untuk lahan sawah pada awal musim kemarau. Makalah ini membahas kinerja Sistem Jabal untuk penyediaan benih kedelai di Jawa Timur dan potensinya untuk *agri-business*.

Kata kunci : Sistem Jabal, benih kedelai, *agri-business*

ABSTRACT

Jabal System is an informal system for seed provision, especially for legume crop seeds such as soybean, groundnut and mungbean. It can be defined as field to field seed distribution system at farmer level and is characterized by seed rotation from the rainy season production on dryland to the dry season production on wetland, or *vice versa*. The most common Jabal System found is in soybean where the crop rotation is very fast and clearly observed, both between seasons or areas. Since there is no established formal seed industry in Indonesia, such system is considered to be an alternative solution for soybean seed provision in the country. Unfortunately, some problems still exist, for example poor genetic purity and improper post harvest handling of soybean seed at farmer level. Despite its weaknesses, Jabal System may potentially improve farmers' or grain collectors' income through soybean agri-business, especially during March – May (early dry season) because the price of soybean during that period is higher than that in the other months as a result of high soybean seed demand for early dry season planting. In this paper, the performance of Jabal System for soybean seed provision in East Java and its potential for agri-business are discussed.

Keywords : Jabal System, soybean seed, agri-business

INTRODUCTION

Soybean has an important role in Indonesian diet as a good source of protein for most population. Unfortunately, until now the supply has not met the demand yet. The trend of increasing soybean deficit in Indonesia has been recorded since the last ten years, i.e. from about 600,000 tons in 1995 became 1.3 million tons in 2004. (Marwoto *et al.*, 2005, data analyzed from FAO, 2004 and BPS, 2004). It means that effort for increasing soybean production is strongly needed. Statistical data indicated that the average yields of soybean at farmer level during these period only slightly increased, i.e. around 1.14 – 1.29 t/ha (BPS, 2004), whereas the average yields reached under control (optimal) condition were 2.0 – 2.5 t/ha (Adisarwanto, *et al.*, 1992; Harnowo *et al.*, 1993).

Based on six groups (islands) of areas where soybean has been cultivated, it showed that Java contributed the most i.e. around 52.8% of soybean area in 1992, followed by Sumatera (28.9%) and Bali + West Nusa Tenggara (9.15%). In 2003, Java still contributed the highest and even higher than in 1992 i.e. around 71.1%, followed by Bali + West Nusa Tenggara (14.04%) and Sumatera accounting for about 7.76% (Anonimous, 2004). In Sumatera, where the soil type is dominated by Red Soil Podsolic with low pH and Al and Fe toxicity become the major problems, soybean may be less competitive than other crops like cassava, maize and groundnut. In Bali + West Nusa Tenggara, on the other hand, the soil is mostly dominated by Entisol type and thus soybean is more adaptive and competitive. For this reason, in 2004 Bali + West Nusa Tenggara became the second most important soybean-producing area after Java. However, it should be noted that nationally, there is an ample decreasing trend of soybean area i.e. from 1.665 million hectares in 1992 to only about 0.569 million hectares in 2004 (Marwoto *et al.*, 2005).

Good quality seed is one of the main input in reaching high crop yield. To date, since there is no established soybean seed industry in Indonesia, the provision of soybean seed at farmer level (about 90% or more of seed supply) is provided through an informal seed supply system, which is called as "Jabal System". According to Sadjad (1981), Jabal System could be defined as a seed rotation from field to field which make best use of the natural rainfall pattern, especially for food crops other than rice. Furthermore, Nugraha (1992) stated in addition to rainfall pattern, variation in time of planting or time of harvesting were also important to be considered to guarantee successful production of high quality seed. It was also stated that Jabal System has some weaknesses that need to be improved before it could be used to develop high quality seed industry.

This paper would briefly discuss the trend of soybean area, productivity and production, and also the performance of Jabal System for soybean seed supply at farmer level, and show the potential of the system to increase farmer's or soybean trader's income through agri-business.

SOYBEAN PRODUCTION AND PLANTING SEASON

Soybean-producing area in Indonesia was concentrated in Java which accounted for about 386,682 ha or about 43% of the total area and contributed to the same percentage of grain of national production. However, it should be noted that nationally, there is an ample decreasing trend of soybean area i.e. from 1.665 million hectares in 1992 to only 0.527 million hectare in 2003. In Java, East Java province is the largest soybean-producing area, contributing about 44% of national harvested areas and about 42% of the total grain production of soybean (BPS, 2004). Thus, fluctuation in national soybean production and availability is strongly affected by the stability of its production in this province. In the case of soybean productivity, however, no great variation was

recorded among provinces, averaging 1,2 t/ha, except for two provinces i.e Nort East Sulawesi and Bengkulu with 0.84 and 0.92 t/ha, respectively (Table 1).

In most areas, soybean is planted in different agro-ecological conditions i.e.: (1) Early Rainy Season (ERS), whereby soybean is planted on dryland/upland. Planting is done in November or December, depending on the start of the rainy season and the crops are harvested in January or February. (2) Late Rainy Season (LRS), whereby soybean is again planted on dryland/upland. Planting is done in March or April and the crops are harvested in May or June. (3) Early Dry Season (EDS), whereby soybean is planted on wetland/lowland in March or April following the harvest of lowland rice and the crops are harvested in June or July. (4) Late Dry Season (LDS), whereby soybean is planted on lowland in June or July following the rotation of rice-soybean-soybean or rice-rice-soybean. In East Java, which contributed to about 44% of the national soybean production areas, the three main agro-ecological conditions for soybean production are ERS, EDS and LDS with the area planted accounted for approximately 30% for ERS and 65% for EDR and LDS (Brotonegoro *et al.*, 1986; Irianto *et al.*, 2005). It is interesting to note that those three agro-ecological areas are also used for "soybean seed" production. The agro-ecological conditions and the possible soybean seed flow are given in Figure 1. Soybean in wetland/lowland is usually grown in monoculture, although occasionally grown in mixed cropping with maize, whereas in dryland/upland, soybean may be planted in monoculture or in mixed cropping with maize, cassava or mungbean. In the latter, crop rotation with soybean varies greatly among areas (locations), but generally includes one or two food crops such as upland rice, maize, groundnut, mungbean or cowpea.

Table 1. Harvested area, productivity and production of soybean by provinces in the year of 2001 and 2004.

No	Province	2001			2004		
		Harvested area (ha)	Productivity (t/ha)	Production (t)	Harvested Area (ha)	Productivity (t/ha)	Production (t)
1	NAD	51032	1.237	63127	25515	1.281	32684
2	Nort Sumatera	9999	1.072	10719	10794	1.063	11469
3	West Sumatera	4117	1.149	4936	1387	1.279	1774
4	Riau	2006	1.141	2289	2019	1.024	2068
5	Jambi	2170	1.087	2359	2921	1.396	4077
6	South Sumatera	4761	1.121	5337	3300	1.299	4288
7	Bengkulu	1505	0.927	1395	3380	0.916	3095
8	Lampung	12172	1.018	12391	5381	1.049	5643
9	Babel	4	1.000	4	0	0	0
	Sumatera	**87731**	**1.169**	**102557**	**54697**	**1.190**	**65098**
10	DKI Jakarta	0	0	0	0	0	0
11	West Java	28550	1.212	34603	21052	1.247	26259
12	Central Java	111818	1.352	151178	79732	1.433	114239
13	DI Yogyakarta	45391	1.106	50202	33488	1.217	40750
14	East Java	280698	1.244	349188	248494	1.199	297864
15	Banten	1659	1.203	1996	3916	1.156	4527
	Java	**468235**	**1.254**	**587167**	**386682**	**1.251**	**483639**
16	Bali	8442	1.404	11852	8550	1.389	11884
17	West NT	67773	1.064	72111	76176	1.210	92186
18	East NT	2010	0.820	1648	3269	1.021	3337
	Bali + NT	**78255**	**1.094**	**85611**	**87995**	**1.221**	**107407**
19	West Kalimantan	1784	1.076	1920	1034	1.161	1200
20	C'tral Kalimantan	3355	1.037	3479	923	1.094	1010
21	North Kalimantan	5167	1.189	6143	4444	1.247	5540
22	East Kalimantan	2000	1.086	2172	1766	1.127	1991
	Kalimantan	**12311**	**1.114**	**13714**	**8167**	**1.193**	**9741**
23	North Sulawesi	2967	1.204	3572	4262	1.229	5238
24	C'tral Sulawesi	2036	0.998	2032	2018	1.209	2439
25	South Sulawesi	14467	1.286	18605	16489	1.515	24976
26	N-E Sulawesi	1641	0.730	1198	2711	0.844	2285
27	Gorontalo	1845	1.178	2173	575	1.369	787
	Sulawesi	**22964**	**1.201**	**27580**	**26055**	**1.371**	**35728**
28	Maluku	1908	1.202	2293	890	1.201	1069
29	North Maluku	-	-	-	498	1.175	585
30	Papua	7592	1.055	8010	4584	1.041	4770
	Maluku + Papua	9496	**1.085**	**10303**	**5972**	**1.076**	**6424**
	Indonesia	**678926**	**1.218**	**826932**	**569568**	**1.243**	**708037**

Source: BPS (2002) and (2004)

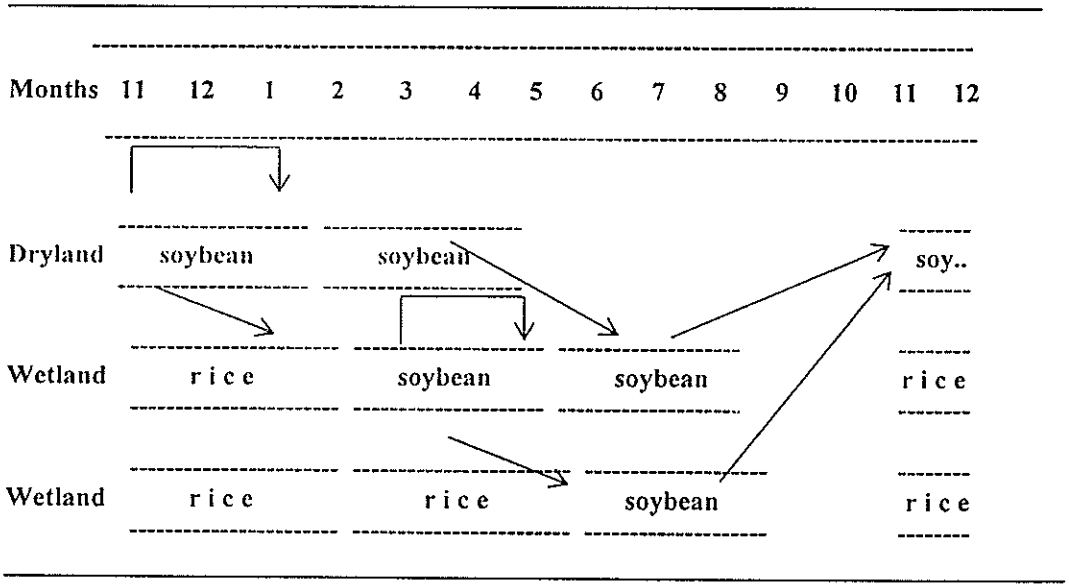

Figure 1. The existing cropping system of soybean based on agro-ecological conditions and the possible seed flow from field-to-field or from season-to- season

THE EXISTING JABAL SYSTEM FOR SOYBEAN SEED PROVISION

As previously mentioned that only about 10% of farmers bought commercial seed, while the rest used seed either from their own harvested crops, from the market or from other farmers. The overview of soybean seed flow in Jabal System is shown in Figure 1. It shows the closed relationship between seed provision and planting time or planting season of soybean, and therefore it implies that differences in planting seasons of soybean in such farming system provide a year-round supply of relatively fresh seed. This system will also simplify problems of seed processing and storage. For farmers, soybean becomes cash crop, whereby the harvested crops/grains are straight to be sold. Only very few farmers secure grains for seed for the forthcoming planting season, rather, most farmers obtain seeds from harvested grains of late dry season (LDS) for early rainy season (ERS) planting, or they use harvested grains from early dry season (EDS) or from late rainy season (LRS) for late dry season (LDS) planting, and they use seeds from harvested grains of early rainy season (ERS) for early dry season (EDS) planting. So, there is a continuous soybean seed flow/seed distribution during the year-round within a series of cropping pattern on dryland and wetland, as clearly shown in Figure 1.

The seed supply in Jabal System is characterized by an informal system and local reproduction of the seed by farmers themselves, using "local" seed selection, production and conditioning practices. This system is different from the formal seed supply system (Douglas, 1980) which is characterized by a vertically organized production and distribution of tested seed and approved varieties, using strict quality control. However, in the view of the availability of good quality seed timely in sufficient quantities during planting seasons, such condition can be seen as one of the advantages of Jabal System since formal seed industries have not yet developed. There were no doubt evidences about seed quality and its effect on the next crop yield by using relatively new harvested soybean seed (Anonimous, 1998; Harnowo, 2005). Almekinders *et al.* (1994) also found that the informal seed supply system was a dynamic system that formed the most important seed source of food crops for small farmers in developing countries. Thus,

based on the above explanation, Jabal System as an informal soybean seed supply system has at least three advantages, i.e. : (1) less storage period of soybean seed, (2) better availability of good quality of relatively fresh seed, and (3) lower seed price due to low conditioning (processing) and storage cost.

However, it should also be noted that the existing Jabal System could discourage the development of soybean seed industries. For this reason, Sumarno *et al.* (1988) stated establishment of soybean seed industry is difficult for several reasons, i.e.: (1) farmers are unwilling to buy seed which cost more than the price of soybean grain, (2) farmers lack of cash money for buying certified seed during the planting time, (3) certified seeds are sometimes not readily available during the planting season, and (4) the price of certified soybean seed is inadequate to cover the cost of seed production.

PERFORMANCE OF JABAL SYSTEM FOR SOYBEAN SEED

The actual performance of Jabal System operating in a specific area engages several groups of key persons or institutions involved in the system i.e.: farmers as seed users, farmers as seed producers, traders as seed collectors, and formal institutions such as Vilage Unit Co-operative ('KUD' = Koperasi Unit Desa) and Non-Government Institution (PT or Persero) working on seed production, processing and marketing (vis. PT Pertani, PT. Sang Hyang Seri, PT Patra Tani). It should be also noted that Jabal System would affect the cropping pattern in a specific area. It means that any disturbances on seed supply in a certain area or planting season will affect on the next planting season, and then finally will affect on the existing cropping system.

The occurrence of seed distribution (seed rotation) between districts based on the need of "seed" in a certain district, the over-production "grains" in other district and the differences in planting time or planting season (Harnowo *et al.*, 1993; Nugraha, 1992, 1993) is an example of the actual performance of soybean Jabal System. We observed in Pasuruan district (Harnowo *et al.*, 1993) that Jabal System may occur in several ways, namely (1) in the village, (2) in the sub-district (between villages), (3) in the district (between sub-district), (4) in the province (between districts), and (5) in the country (between provinces or islands). An example of the actual performance of such system for soybean seed is depicted in Figure 2. Indeed, it was a dynamic system justifying such mechanism to be an important seed source of several food crops other than rice, especially for soybean.

Figure 2 shows that seed distribution among farmers was found under case 1 and 2, whereby the distances became an important factor for seed distribution. The role of "grain collector" as small trader and big trader as "seed trader" may occur under case 2,3 and 4; whereas the involvement of Non-Government Institution such as PT Pertani, PT Sang Hyang Seri and PT Patra Tani was found under case 4 and 5. It is important to note that although soybean seed distribution in a certain province during a restricted period (year) has been calculated based on the harvested area, production and the need of seed during a series of cropping pattern, it should be kept in mind that such calculation (analysis) might change due to the dynamic changing of planted (harvested) area of soybean every season and year, as shown by the decrease in harvested area yearly (BPS, 2004). It implies that recalculation (reanalysis) of seed distribution quantitatively within district or within province is needed. Those kinds of analysis will be very important for planning of seed supply in a certain area. In other word, due to the dynamic of seed supply mechanism under Jabal System, the analysis of seed requirement and its possible direction of distribution during a restricted period can only be used to predict the quantity of seed needed during those periods and the location (area) from where the seed may be obtained.

In addition, it was also observed that farmer-to-farmer seed exchange mechanisms were mostly based on traditional social networks and family relation. Although a number of reports showed some weaknesses of such mechanism (Almekinders, 1994; Anonimous, 1998; Harnowo *et al.*, 1993; Mulyono and Suyono, 1998; Nugraha, 1992, 1993), but we agree, at least up to the time until a formal seed supply system is established, that the existing informal seed supply system is able to provide good quality soybean seeds in most area and planting season timely in sufficient amounts. In addition to the above advantages, Jabal System has potential for the diffusion of new varieties, as reported by Almekinders *et al.* (1994) whereby in many developing countries, most farmers obtained seeds of new varieties from informal seed sources, primarily from their own communities, which were sometimes never officially released.

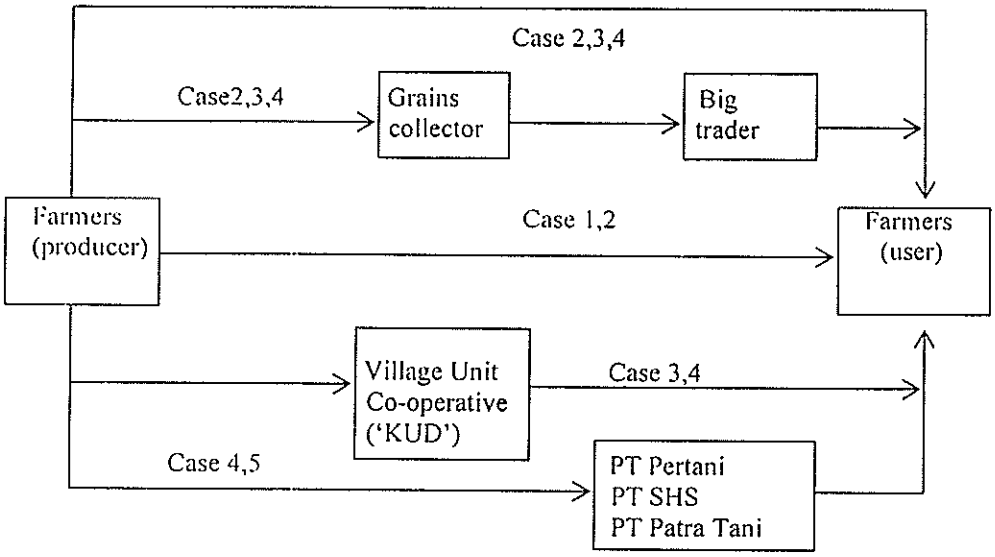

Figure 2. The performance of soybean seed distribution under Jabal System, from case study in Pasuruan district, East Java

Note: Case 1 : seed distribution in the village
Case 2 : seed distribution in the sub-district (between villages)
Case 3 : seed distribution in the district (between sub-districts)
Cace 4 : seed distribution in the province (between districts)
Case 5 : seed distribution among provinces

THE POTENTIAL OF JABAL SYSTEM FOR AGRI-BUSINESS

Soybean has poor storability which loses viability very rapidly under warm and humid conditions of storage (Bhatia, 1996; Delouche, 1980). It implies that improper storage conditions, especially in tropical areas, such as Indonesia, may decrease viability of soybean seed. Ideally, in order to fulfill the need of high quality soybean seed timely in sufficient amount in every planting season, seed requirement should be supplied from an established certified seed industry having good seed marketing and distribution channel. In such system, seed storage component becomes the crucial part, as preservation of soybean seed quality is difficult, except ideal storage conditions are provided. However, the development of such storage conditions for large quantities of certified seeds is

relatively expensive. For those reasons, production of certified soybean seed will be efficient if it is done in commercial scales followed by the establishment of an effective both internal and external seed quality control system.

However, since soybean seed industry have not established yet in the country, the existing Jabal System which means the "local" or "field-to-field" seed supply system is acceptable. Under such system, there is a potential for doing agri-business on "soybean seed". Figure 3 shows three aspects related to soybean seed supply, i.e.: soybean production, seed requirement and grain (soybean) price in the market during one year's planting seasons. There was an indication of a positive correlation between monthly soybean seed requirement and the grain price (see Figure 3). Furthermore, the grain price was high during the peak planting season, namely during the early dry season/EDS, March – April (see also Figure 1 and 2), where soybean production from early rainy season (ERS) was lacking. Again, since there were no real soybean seed producers in the area, rather than, farmers, soybean grain collectors or big soybean grain traders did simple grain processing and conditioning, the price of processed soybean grains used for "seed" was higher than that of unprocessed grains. Thus, in the field (in the area of soybean production), there is a chance or potential for developing "soybean seed" agri-business under the existing Jabal System.

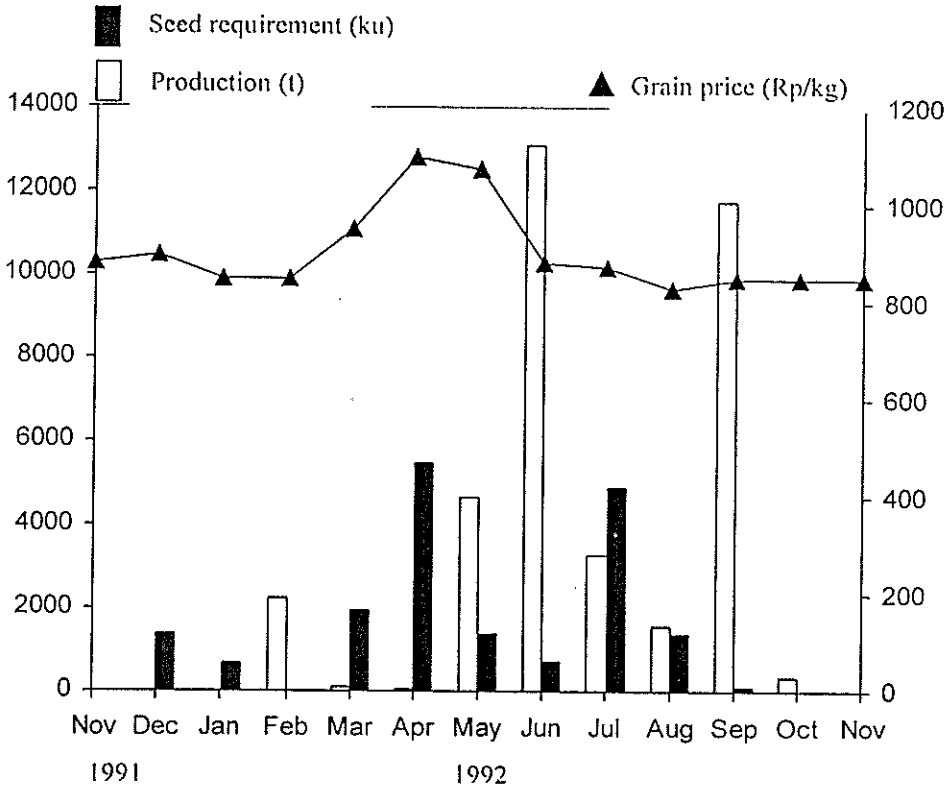

Figure 3. Monthly fluctuation of soybean production, seed requirement, and soybean grain price observed in Pasuruan district, East Java during the year of 1992. (Redrawn from Harnowo *et al.* (1993))

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