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Analysis of Indonesian Soybean Production Result by Intercropping Plants

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Abstract. Domestic soybean production in Indonesia is still lack in fulfilling the country's demand. The soybean import rate is still high, for about 253% from the domestic need. Strategies were studied and developed to increase the domestic soybean production that could reduce the import rate. The objective of this study was planting domestic soybean together with vegetable crops, named intercropping method, in order to increase the production to meet the soybean demand. The principle of this research is testing some variables that affect the fulfillment of soybean needs to reduce imports. The research was conducted by experimentally using five superior varieties of Raja Basa, Mutiara 1, Dega 1, Dena 1, and Grobogan, to be grown next to small red chilli, long green eggplant and sweet corn plants. The experiments and data collection were carried out in carried out in Pulungdowo Village. The data processing and analysis were using an experimental design that is a random block design with a confidence level of 95%. The results showed that there was no difference in the use of varieties with vegetable crops on soybean production, but each Indonesian soybean variety has production potential according to the profile of the variety.

Keyword: Soybean Varieties, Intercropping Plants, Production Results

1. Introduction

Soybean commodity needs in Indonesia is still much to be met from production quantities are available. Most provinces in Indonesia had done soy soybean cultivation but each vilages still greater need . Here can be seen the target and actual production of some strategic commodities Indonesia in 2012, in Table 1 below:

Table 1. Target and Realization of Strategic Commodities in 2012

Indicator	Commodities (in Thousands)				
	Rice	*Corn*	*Soy*	*Sugar*	*Beef*
Production Target (ton)	68.000	22.000	1.600	3.900	439
Realisation (ton)	69.056	19.387	843	2.600	545
Imports (ton)	1.927	1.889	2.128	494	58
Imports (%)	3	9	253	19	11

Table 1. shows that to meet the needs of soybeans in 2012 were supplied from imports by 253%, since the need for soybean is much greater. It is estimated that until 2019 imports will still be 229% [1], while rice imports will be carried out as a reserve inventory even though production is more than targeted, bearing in mind that rice is a strategic commodity in the first place.

Therefore, a strategy is required to meet the needs of imported soybean not grow their own, but with the soybean production in the country [2]. If the production of soybean production in the country is not anticipated there will remain a deficit until stage III RPJMN 2015-2019 approximately 229% [1]. Acceleration of increasing production can be done through intercropping, utilizing Perhutani land, plantation land and abandoned land [3].

This research is a continuation from the first year which is a verification of the novelty of the previous research, namely "Alternative Models of Soybean Production Inventory Strategy for Domestic Production to Achieve Self-Sufficiency". Where research in the first year verified the independent variable (X6), namely: High productivity with indicators, namely: 1). Give direction. 2) Finding superior seeds. 3). Implement production techniques that are adaptive to location. 4) Applying the use of appropriate inputs (types of seeds, fertilizers and pesticides).

This paper is a second year research, which is verifying the independent variables, namely land and intensification (X5), [4, 5, 6, 7, 8]. with indicators, namely: 1) Planting Monocultures [6, 9] Planting intercropping at least 2 kinds, [1,5]. 3) Planting throughout the year [5,10]. 4) Utilization of abandoned land [6, 10, 11, 12, 13,14, 15, 16, 17]. 5) Utilization of Perhutani land, plantations and other land [10, 1]. Where the indicators of monoculture planting and planting throughout the year have been carried out in year I. The dependent variable is the High Production Variable (Y1), through productivity and area expansion [10] with indicators namely: Increased Planting Areas [18, 19,20] and Land Use Transfer [6, 8, 17]

2. Research Method

The principle of this research is testing some variables that affect the fulfillment of soybean needs to reduce imports. The experiments are done by conducting intercropping 3 kinds of vegetable plants with 5 Indonesian soybean seeds. This kind of treatment has not yet been done by domestic soybean farmers. Experiments and data collection were carried out in Pulungdowo Village, Tumpang District, Malang Regency, East Java Province, Indonesia. The selection of soybean varieties was based on shape and color considerations is almost identical to imported soybeans and high yield profile. Likewise, consideration of the use of vegetables is based on the desires of those who own land, namely vegetable farmers, so that it is hoped that it can be used as an alternative farming business.

The data processing and analysis were using random block experimental design, which is in accordance with the treatment, with a confidence level of 95%. There have been a number of varieties found in domestic soybean production. Therefore the model used is random, meaning that the conclusion can be applied to all other domestically produced soybean varieties.

This research uses, using Excel software. TKT status (level of technological readiness) level 3 and targets to determine growth and production results so that production models can be obtained that have an impact on meeting demand.

The novelty of this research is intercropping planting of 5 kinds of soybean varieties with 3 kinds of vegetables including green eggplants which have never been done. So far, Indonesian farmers use 1 type of soybean with 1 kind of vegetable, namely corn. In addition, the time/month of planting in a particular month while in this study the time/month of planting can be every month/at any time.

3. Results and Discussion

From the experiment employed by planting Indonesian domestic soybean in line with the theory and guidance of soybean research and development unit, Department of Agriculture especially food crop in Jember Regency, East Java province, Indonesia [21], the production data from 5 varieties of domestic soybean production shown as follows:

Table 2. The production result of 5 varieties of domestic soybean production (Kg/10m x 10m)

Block (Tumpangsari)	Variety				
	Raja Basa	Mutiara 1	Dega 1	Dena 1	Grobogan
Small Chilli	2	1,9	2,1	2,3	2,2
Green eggplant	2	2	2	1,8	2
Sweet corn	1,8	2,4	2,1	2,3	2,7
Amount	5,8	6,3	6,2	6,4	6,9
Average	1,93	2,1	2,06	2,13	2,3

Hypothesis: Variance $(\sigma^2) = 0$ = There is no difference in the use of varieties with vegetables on soybean production

Table 3. Analysis of Variance of Domestic Soybeans

Variation Sources	Degree of Freedom (dk)	Sum of Squares (JK)	Average of Sum of Squares (RJK)	F Calculate
Average	1	66,57	66,57	
Block (vegetables)	2	44,756	22,378	
Treatment (Indonesian Soybean Variety)	4	0,2	0,05	0,0091
Margin error	8	-44,146	5,518	

With the confidence level of 95%, the F value was 0.05 (4, 8) = 3.84 → with F calculate <F table; the hypothesis was confirmed. It meant that there was no difference in the production due to the varieties.

The results showed that there were no differences in the crops of various soybean varieties grown together / intercropped with vegetables. The difference in production results of various varieties that occur is not due to planting with vegetables / intercropping but indeed each soybean has its own profile, (Source: UPTD Bangsal Sari Jember and Balitkabi Gadang Malang, East Java Province, Indonesia).

The profile of the production of each variety is as follows (Source: UPTD Bangsal Sari Jember and Balitkabi Gadang Malang, East Java Province, Indonesia): (Ton / Ha)
1. Rajabasa   : Potential results 3.9, average = 2.05
2. Mutiara   : Potential results 4.1, average = 2.4
3. Dega 1   : Potential results 3.82, average = 2.78
4. Dena1   : Potential results 2.9, average = 1.7
5. Grobogan   : Potential results 3.4, average = 2.77

The block effect is not a concern because the theory of the use of block design is the use of 2 independent variables. But, only one of the more important independent variables will be analyzed, that is the one treated. Meanwhile, the independent variable 1 again becomes a block. The block design characteristic is that each treatment only has 1 observation data. If the observation data amounted to 2 or more then the analysis is said to use a 2 factor design [22]

Soybeans have their own profile besides the potential for production results, which include: diameter, color, leaf width, tree height, as well as different uses, for example tempeh, tofu, soy sauce, medicines, beauty, milk, flour, meat Imitation, Salad Oil, M. Fried, White Butter, Margarine, Wetting Agent, Solvent, Emulsifier, Stabilizer, Lubricant, Rerotlen, Ice Cream, Yogurth, Baby Food, Soy Cheese, etc., (Soybean industrial tree, Marwoto and Hilman, Y. 2005: 14).

3. Conclusion:
1. There is no difference in the use of soybean varieties with vegetables on soybean production.
2. Each Indonesian soybean variety has production potential according to the profile of the variety.
3. The selection of varieties was not based on production but also included many factors including size, color of soybeans and use of soybeans themselves.

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