

INFLUENCE PLANTING SPACING AND FERTILIZER APPLICATION GROWTH AND PRODUCTION PLANT SOYA BEAN (*Glycine max L. Merrill*)

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ABSTRACT

This study aims to look at the effect of plant spacing and fertilization on the growth and production of soybean (*Glycine max* (L.) Merrill). This research has been conducted in the Village Land Sipolu-Polu District of Panyabungan Mandailing Natal The Beginning In May Up to September 2016. The method used was a randomized block design (RAK) Factorial with 2 (two) treatments and 36 (Thirty Six) experimental plots. Parameter observations made that plant height (cm), number of pods pithy (of fruit), the number of empty pods (of fruit), and the wet weight of peas (kg). Based on the results of the study indicate that treatment spacing of no significant effect on the growth and yield of soybean. The best treatment is contained in the treatment with a spacing of 20 × 20 cm. Fertilization treatment (ZA fertilizer and Urea at a dose of 30 g / plot) do not provide any real effect on observations of plant height (cm) wet pods weight (kg), number of pithy pods (of fruit) and the number of empty pods (of fruit). The best treatment there is in treatment by administering ZA 30 grams / plot. Interaction treatment plant spacing and fertilization has no significant effect on the growth and yield of soybean. The best treatment is contained in the treatment with a spacing of 20 × 20 cm and fertilizer application ZA 30 grams / plot.

Key words: Soybean Plants, Plant Spacing, Fertilization

INTRODUCTION

Soya bean is one of the type plant abundant secondary crops cultivated by the Indonesian people . Soybeans utilized by the community as sources of vegetable protein , for example as material standard tofu , tempeh , soy sauce , tauco , milk and others. With increase population , then need soybeans are also increasing increased . Meanwhile That production soybeans in Indonesia are not yet capable balance need so that government Still do import Because production domestic only capable meet 30-40% of needs National (Puslitbangtan , 2012). Production soya bean national in a number of year final Keep going experience decline . In 2009 production national has reached 9.75 million tons, in 2012 it fell to 7.83 million tons because decrease wide harvest from 7.23 million ha to 5.70 million ha (BPS, 2012). Efforts that can done For increase results soya bean among them is

intensification and extensification . Efforts extensification that can done is treatment distance proper planting and fertilization . Various pattern arrangement distance planting has done use get optimal production . Use of distance plant on plants soya bean viewed necessary , because For get growth uniform plants , distribution even distribution of nutrients , effectiveness use land , making it easier maintenance , emphasizing development pests and diseases as well know How many Lots seeds needed at the time planting .Arrangement from distance planting soya bean will be very decisive results from soybeans . According to Murrinie (2010), determination distance planting depending on power grow seeds , fertility soil , season , and variety planted . Seeds that are growth rather low , necessary planted with distance more planting tight . On the ground yng fertile , distance planting that is a bit loose more profitable . Many varieties branching , distance more planting loose cause results more good . Research results from Ali (2004) shows that distance planting general give very real influence to vegetative growth plant peanut land and influence real to variables production .Improvement results high soybeans required deep nutrients and minerals amount Enough or balanced in fulfil need said . Soybeans requires and absorbs macro nutrients or Nitrogen, Reported that For get results seed 2.50 tons/ha, required nitrogen around 200 kg/ha. From the amount of which , approximately 120 – 130 kg of nitrogen is filled from activity fixation nitrogen. However thus , when use fertilizer nitrogen too many , will pressing quantity and size nodule root so that will reduce effectiveness binding of N₂ from the atmosphere (Irwan , 2006).

METHOD STUDY

Study This carried out on land Village Sipolu - polu Subdistrict Payabungan Regency Mandailing Natal, with height place 1100 m above sea level which starts in May until with September 2016. Materials used in study This is seed soya bean varieties local , urea fertilizer , fertilizer ZA, water, and compost. Tools used in study This consists of from, hoe , machete, scales , bucket, watering can , shovel , tool measuring (ruler), rope plastic , as well as tools and materials others that support study this.Method research used is Design Random Group (RAK) factorial with 2 factors namely : Factors First treatment with planting distance ,J1 = Planting distance 20 cm x 20 cm, J2 = Planting distance 30 cm x 20 cm, J3 = Planting distance 40 cm x 20 cm. Factor second treatment application fertilizer , P0 = control, P1 = Application Urea fertilizer 30 grams/plot, P2 = Application ZA fertilizer 30 grams/ plot. The parameters observations that done in study This is High plants (cm), Number pod nutritious / sample (fruit), Amount pod empty / sample (fruit), Weight wet pod stalk / sample (kg)

RESULTS AND DISCUSSION

Tall Plant (cm)

Based on results analysis variety from treatment distance planting and fertilization to high parameters plant soybeans (cm) can See attachment 2 to attachment 16. Average tall plant (cm) plant soya bean from treatment distance planting and fertilization as well as its interaction with all age observation can seen in the table 1.

Table 1. Average tall plant soya bean 2 – 6 Sunday after planting (cm)

Age Treatment	Observation Sunday After Plant (MST)				
	2	3	4	5	6
J1	2.83	5.80	12.34	18.84	45.04
J2	2.73	5.52	10.31	18.02	41.80
J3	2.69	5.74	10.13	16.74	39.42
P0	2.72	5.62	12.57	17.02	41.76
P1	2.78	5.53	10.66	19.32	44.86
P2	2.76	5.91	9.57	17.27	39.66
J1P0	2.10	4.10	13.05	15.65	35.05
J1P1	2.23	4.25	7.45	14.75	35.58
J1P2	2.05	4.70	7.28	12.00	30.73
J2P0	2.03	4.35	9.03	11.98	32.55
J2P1	2.03	4.03	7.48	16.43	34.33
J2P2	2.10	4.05	6.70	12.15	27.18
J3P0	2.00	4.20	6.20	10.68	25.83
J3P1	2.00	4.18	9.05	12.30	31.55
J3P2	2.05	4.55	7.55	14.70	31.33

Based on Table 1 of results analysis fingerprints variety can seen that treatment distance plant on all age observation Sunday after planting No give real influence . However on average high tallest plant (cm) was found in treatment J1 (20 × 20 cm) which was 45.04 cm and the lowest was in treatment J3 (40 × 20 cm) which was 39.42 cm. The planting distance was not influential real to tall plant soya bean allegedly Because difference room grow at a distance planting the Not yet capable give response or pressing growth tall plant so that distance planting give the same response . This is in line with study Naibaho (2006) who reported results his research that differences that are not real show that plant soya bean have same response to distance plant at a height plants . Quality light obtained plants that cause competition between plant both inside and outside body plant That Alone .

Treatment giving Urea and ZA fertilizers on all age observation Sunday after planting No give real influence . However in a way average height The highest plant height (cm) was in treatment P1 (30 grams of urea/plot) , namely 44.86 cm, while treatment the lowest was in treatment P2 (ZA 30 grams/plot) , namely 39.66 cm. This allegedly two fertilizer given between type different fertilizers with the dosage The same No influential to tall plant .

Treatment interaction distance planting and giving fertilizer on average plants highest found in combination the J1P1 treatment was 35.58 cm and the lowest was in the J3P0 treatment , namely 25.83 cm. This is to be expected Because distance planting too much narrow result in competition light sun so that result in elongation cell plant , and also provides internal nutrients amount limited . Matter This in line with study Sarief (1986) state that availability sufficient nutrients moment growth then the process of photosynthesis will more active , so that elongation , division and differentiation cell will more good too. So it's getting better Lots nutrients that can absorbed by plants soya bean then the process of photosynthesis will more active so that will speed up growth tall plant

Amount Pod Pithy And Amount Pod Vacuum / Sample (Fruit)

Based on results analysis variety from treatment distance planting and fertilization to the number parameter pod substantial and voluminous pod empty production soybeans (cm) can see attachment 17 to Appendix 22.Distance treatment planting and fertilization No give the influence that real to amount pod rich amount pod empty , so is interaction from treatment distance planting and treatment fertilization to amount pod substantial and voluminous pod empty No give real influence . Average amount pod nutritious and pods empty / sample (fruit) of treatment distance planting and fertilization as well as the interaction can seen in table 2 below .

Table 2. Flat- flat amount pod pithy And amount pod empty / sample on plants soybean (fruit)

<u>Quantity Treatment pod (fruit)</u>	<u>Pithy</u>	<u>Empty</u>
J1	121.77	3.53
J2	127.73	3.37
J3	119.29	3.68
P0	125.32	2.98
P1	112.19	3.38
P2	131.28	4.22
J1P0	107.60	1.50
J1P1	86.05	2.70
J1P2	80.33	3.75
J2P0	99.80	2.98
J2P1	85.73	2.73
J2P2	101.88	1.88
J3P0	74.58	2.23
J301	80.65	2.18
J3P2	113.18	3.88

Based on Table 2 of results analysis fingerprints variety can seen that

treatment distance planting No give real influence . However in a way average number pod the most nutritious (fruit) found in treatment J2 (30 × 20 cm) namely 127.73 fruit and that lowest on treatment J3 (40 × 20 cm) which is 119.29 pieces . Whereas amount pod empty The largest number was in treatment J3 (40 × 20 cm) , namely 3.68 pieces and the lowest found in treatment J2 (30 × 20 cm) , namely 3.37 pieces .Incorrect planting distance influential real to amount pod full and empty matter This allegedly Amount pods that form influenced by ray sun on the process of photosynthesis in the process of formation flowers and fruit to amount pod soya bean , Study Djukri (2005) about influence distance planting and varieties soya bean to radiation ray sun , biomass and productivity soybeans jasmoro , tanggamus , and wilis , showing that at the age of 40 HST castor bean plants planting influence size intensity light pass canopy . Varieties that show intensity smallest , produces biomass largest . Pruning and spacing plant on the third varieties produce amount pod plants and weight seed dry / 10 plants different .

Treatment giving Urea and ZA fertilizers do not give significant impact on the quantity parameters pod rich and empty . However on average the number pod The highest number of fruits (cm) was in treatment P2 (ZA 30 grams/plot) , namely 131.28 fruits , whereas treatment the lowest was in treatment P1 (Urea 30 grams/plot) namely 112.19 pieces . This matter guess because certain nutrients play a role in formation flower . Hara macro - micro absorbed by plants moment treatment utilized in growth reproductive such as Bo, Ca, S and Mo. Micronutrients the utilized in formation as well as growth pollen and flowers , ripening seed formation of proteins and materials active in plant as well as can neutralize sour organic products produced in metabolism . Flowers that formed will influence amount pods are formed , so will affect heavy wet pods , weight wet seeds and weight dry seeds (Hardjowigeno , 1995).

Amount pod No influenced by distance planting and interaction between distance planting and fertilization . Naibaho (2006) in his research report that distance planting No influential real allegedly Because There is competition in taking nutrients , water, and light sun . Based on Table 2, although in a way statistics distance planting No affect the amount pods , however results amount pod highest namely at a distance plant 30 x 20 cm. This allegedly Because size room growth obtained by plants so that competition No too big in taking nutrition and light and pods that formed the more many . According to Ali (2004), the distance growing crops meeting will lower amount pod pithy plants . More carry on Trustinah (1993) *in* Ali (2004) added if competition This continue in a long time then matter This can increase amount wrinkled and lowered seeds amount pod pithy .

Heavy Wet Pod And Stalk / Sample (kg)

Based on results analysis variety from treatment distance planting and fertilization to weight parameters wet pods and stalks can see attachment 23 to attachment 25.

Average heavy wet (kg) plant soya bean from treatment distance planting and fertilization as well as its interaction with all age observation can seen in the table 3.

Table 3. Average weight wet pod And stalk (kg)

Severe Treatment	Wet Pod And Stalk (kg)
J1	1.69
J2	1.30
J3	1.38
P0	1.41
P1	1.37
P2	1.59
J1P0	1.38
J1P1	1.23
J1P2	1.20
J2P0	0.93
J2P1	0.88
J2P2	1.13
J3P0	0.88
J3P1	0.98
J3P2	1.25

Based on Table 3 of results analysis fingerprints variety can seen that treatment distance planting No give real influence . However in a way average heavy wet stalk pod (kg) highest there is on treatment J1 (20 × 20 cm) which is 1.69 kg and the lowest in treatment J2 (30 × 20 cm) which is 1.30 kg. This is allegedly amount population plant influential to production plant soybeans, Settings distance planting is also one of the factors that must be noticed For get optimal growth and production . According to Harjadi (1993) distance planting will influence efficiency use light , competition between plant in use of water and nutrients will be influence results . While According to Trustinah (1993) *in* Ali (2004), distance dense planting cause occurrence competition For get water so that happen accumulation material maximum dryness . Eprim (2006) added with distance spaced planting soya bean capable get light optimally so that the process of getting light optimally so that the photosynthesis and water filling processes assimilate to pod No disturbed .

Treatment giving Urea and ZA fertilizers do not give significant effect on weight parameters wet pods . However on average weight wet pod highest (kg) in treatment P2 (ZA 30 grams/plot) namely 1.59 kg, whereas treatment The lowest was in treatment P1 (Urea 30 grams/plot) , namely 1.37 kg. Al-jabri (2009) reported that the provision of ZA fertilizer on the soil sour give improvement results soya bean as big as 46%. Element Hara Nitrogen An Sulfur is abundant nutrient insurance needed plant soybeans . Role sulfur nutrients especially as enzymes and,

Vitamins and useful ones in the process of photosynthesis For production plants (Novizan , 2002).Treatment interaction distance planting and giving fertilizer on average weight wet pods / samples (kg) gives unintended influence real However on average weight wet pod highest found in combination treatment J1P0 , namely 1.38 kg and the lowest in treatment J3P0 , namely 0.88 kg. This matter allegedly that availability nutrients and factors environment influence growth and production plant soybeans , the nitrogen element is material protein forming so that element This required For growth seed soybeans . The nitrogen element is also component essential in amino acids that become base protein formation , also in nitrogen bases present in sour nucleic and related compounds , such as ATP (Tjitrosomo , 1993) which finally add heavy dry seed .

CONCLUSION

Treatment distance planting No give influence the real thing on growth parameters tall plants and production soybeans . Based on the average there are trend treatment best found in the treatment with distance planting 20×20 cm. Treatment fertilization No give influence Which real on growth parameters tall plants and production soybeans . Based on the average there are trend treatment best found in the treatment with giving ZA fertilizer 30 grams/plot . Interaction treatment distance planting and fertilization No give real impact to growth and production soybeans . Based on the average there are trend treatment best found in the treatment with distance planting 20×20 cm and giving ZA fertilizer 30 grams/plot.

SUGGESTION

Need done study more carry on about use distance proper planting and fertilization dose the right fertilizer that suits For plant soybeans . The seeds must uniform or seeds superior so as not to happen difference type its growth .

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