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PERFORMANCE OF DIFFERENT INDIGENOUS GENOTYPES OF FRENCH BEAN DURING KHARIF SEASON UNDER MID-ALTITUDE CONDITION.

T.Supongmar Longchar & N.Tekatushi Ao

Abstract

A field experiment was conducted at State Agriculture Research Station, Yisemyong, Mokokchung district, Nagaland during Kharif season of 2011 to compare growth and yield attributes of different indigenous cultivars of French bean (Kholar). The results revealed that Cv. Kholar brown beans type (T_{13}) recorded the highest values for number of pods/plant, length of pod, pod weight and grain yield/ha.

INTRODUCTION:

French bean (***Phaseolus Vulgaris Linn***), locally known as Rajmash or Kholar is an important and highly profitable pulse crop in Nagaland. It has been reported that a large number of indigenous French bean germplasm are found in Nagaland. Among the pulses, this is a major crop cultivated especially in Tuensang and Kiphire districts. Generally, French bean is consumed as grain pulse which is a very rich source of protein. The area under cultivation of this crop is increasing due to increase in demand in the market. However, the main problem confronted in French bean cultivation is its low yield due to lack of proper collection, identification and selection of suitable high yielding varieties. Keeping this in view, seventeen different genotypes of French bean were collected and varietal experiment was carried out to determine its yield potential, to identify and select the suitable cultivars for higher productivity of French bean under mid-altitude condition and at the same time to maintain the indigenous French bean germplasm.

MATERIALS AND METHODS:

A field experiment was conducted at State Agricultural Research Station (SARS), Yisemyong during kharif season of 2011. SARS is located at an altitude of 1050 metre

Table-1. Yield attributes and yield of French Bean as influenced by different Genotypes.

Treatments	No. of pods/plant	Length of Pod(cm)	Pod Weight/ Plant (g)	No. of Grains/pod	Test weight (g)	Grain Yield (q/ha)
T_1	20.63	11.2	20.33	5.20	47.50	13.63
T_2	15.60	11.5	14.06	5.8	39.03	11.00
T_3	18.06	9.8	8.46	5.1	18.36	9.21
T_4	17.96	10.8	18.60	4.8	54.30	12.41
T_5	19.63	10.2	19.50	4.8	49.50	13.00
T_6	14.53	12.9	20.93	5.2	53.40	14.58
T_7	17.30	11.6	18.63	4.7	59.60	14.16
T_8	18.73	11.9	18.56	3.5	44.30	13.06
T_9	18.10	10.7	22.63	7.2	47.90	15.27
T_{10}	23.76	10.6	17.63	6.0	44.60	14.20
T_{11}	17.83	12.6	13.76	6.7	47.50	9.96
T_{12}	21.06	17.1	16.23	5.5	31.40	11.91
T_{13}	35.86	17.1	22.93	8.1	31.50	16.02
T_{14}	24.30	12.4	18.83	5.3	34.20	12.40
T_{15}	25.96	13.4	18.20	5.2	50.00	12.88
T_{16}	16.76	11.7	18.70	5.4	47.60	12.63
T_{17}	13.06	12.0	17.83	4.8	37.90	13.33
SEm±	2.22	0.73	2.05	0.33	0.20	0.22
CD (P=0.05)	6.41	2.13	5.94	0.95	0.60	0.65

above mean sea level. The soil was sandy clay loam in texture with high acidic in reaction (pH 4.9), electrical conductivity (0.2 mmhos/cm), medium in organic carbon (0.60 %), low in available phosphorus (5.00 kg/ ha) and low in available potassium (110 kg/ha). The experiment was laid out in a Randomized Block Design with three replications. Seventeen different locally available genotypes of French bean viz., T_1=Kholar white, bold with red patch, T_2= Kholar White medium, T_3= Kholar white small, T_4= Kholar brown medium, T_5= Kholar dark brown stripe, T_6= Kholar light brown with maroon stripe, T_7=Kholar brown small, T_8= Kholar pink stripe, T_9= Kholar brown round stripe, T_{10}= Kholar red large, T_{11}= Kholar dark red, T_{12}=Kholar reddish small, T_{13}=Kholar brown beans type,

T_{14}=Kholar black, T_{15}=Kholar purple, T_{16}= Kholar dark purple and T_{17}= Kholar light purple were sown on the 25th of April 2011 at a spacing of 45cmx30cm. Fertilizers such as Nitrogen in the form of Urea, Phosphorus in the form of Single Super Phosphate and Potash in the form of Muriate of Potash @ 60:60:20 Kg/ha was applied. Half dose of Nitrogen and full doses of Phosphorus and Potassium was applied as basal dose during final land preparation. The remaining half dose of Nitrogen was applied as top dressing at flowering stage. The crop was raised under rain fed condition and all necessary observations were recorded on five randomly selected plants from each plots.

RESULTS AND DISCUSSIONS:

YIELD ATTRIBUTES:

A close scrutiny of the data in table-1, indicates varying responses of the genotypes to number of pods/ plant, length of pod, weight of pod/ plant, number of grains/pod, and test weight of grains. Maximum number of pods/ plants (35.86) was recorded from treatments (T_{13}) which was statistically significant over other treatments. Lowest number of pods/ plant (13.06) was recorded from treatment (T_{17}). Similarly, longest length of pod (17.1 cm) was also obtained from treatment (T_{13}) which was followed by treatment (T_{12}). These two cultivars were statistically at par and significantly higher than other genotypes.

In respect of pod weight/plant, the highest value (22.93g) was recorded from treatment (T_{13}) followed by treatment (T_9). These two treatments were statistically higher than rest of the treatments. Lowest values were recorded from treatments (T_3) and (T_{11}) respectively.Consequently, treatment (T_{13}) also recorded the maximum number of grains/pod (8.1) and was followed by treatment (T_9). The lowest number of grains/ pod (3.5) was recorded from treatment (T_8). Significant variation among the genotypes were observed in the test weight of grains. Treatment (T_7) recorded the highest Test weight (59.6g)which was significantly higher than the others. Treatment (T_3)recorded the lowest test weight (18.36g).

YIELD:

Significant variations among the genotypes were observed with respect to grain yield. Highest grain

yield (16.02 q/ha) was recorded from treatment (T_{13}) which was significantly superior over the other genotypes. A higher grain yield was also recorded from treatments (T_9) and (T_6) respectively. It is evident that treatment (T_{13}) had better yield attributing characters such as maximum number of pods/plant, length of pod, Pod weight and number of grains/pod which consequently resulted into higher yield. Conversely, treatment (T_3) produced the lowest grain yield (9.21 q/ha). The low yield was due to contributions of poor yield attributes which ultimately resulted into lower grain yield.

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EFFECT OF N P K FERTILIZERS ON TUBERLET PRODUCTION USING TRUE POTATO SEED (TPS) UNDER DIFFERENT ROW RATIO

T. Supongmar Longchar & L. Nungsang Jamir

Abstract

Experiment was conducted at State Agriculture Research Station, Yisemyong, Mokokchung district, Nagaland during 2010-11 to study the effect of NPK fertilizers on tuberlet production using TPS under different row ratio showed that single row sowing at 20x5 cm spacing with 100:100;50 NPK (kg/ha) recorded the highest tuberlet yield of (101 q/ha).

INTRODUCTION:

Potato ***(Solanum tuberosum* L.**) is the most important crop among the tuber crops. This crop is cultivated in all the districts of Nagaland. Potato production through seed tuber is the traditional way of cultivation. This system is expensive and has many constraints. The major limitation is due to non-availability of good quality tuber for planting materials. Preliminary works has been carried out earlier on the use of TPS as planting material for potato production in Nagaland which revealed that the use of TPS have many advantages over traditional method of potato production through clonal tuber seeds. Particularly, the cost of tuber seed which generally accounts for 40-50 per cent of the inputs for potato production can significantly be reduced by the use of TPS. The use of TPS as planting material for potato production can be done in three different ways. They are;

1. Direct seed sowing in main field.
2. Raising of small seedlings in the nursery for transplanting in the main field.
3. Producing tuberlets in high density nursery beds for planting as seed tuber in the following season.

Among the three methods, earlier trials also revealed that production of tuber lets by using TPS during first season under assured irrigation facilities and its subsequent utilization as planting material (seed

tuber) for ware potato production in the next season was the best alternative remedy for the problems encountered in the traditional system of potato production.

Basing on earlier trials, the present investigation was carried out to validate the following:-

1. To determine a suitable planting method for tuberlets production by using TPS.
2. To determine the optimum requirement of NPK fertilizer for tuberlets production using TPS.
3. To provide an enterprising opportunity to farmers with access to irrigation facilities to generate high quality tuberlets production.
4. To provide quality planting materials to traditional potato farmers.

MATERIALS AND METHODS:

A field experiment was conducted during winter season of 2010-11 at State Agricultural Research Station, Yisemyong located at an altitude of 1050 m above mean sea level. The soil was sandy clay loam in texture with highly acidic in soil reaction (pH5.0), electrical conductivity (0.3mmhos/cm), medium in organic carbon (0.63 %), low in available phosphorus (10.0 kg/ ha) and available potassium (115 kg/ ha). The experiment consisted of two methods of sowing viz: M_1– Single Row Method with a spacing of 20cmx5cm and M_2– Double Row Method with a spacing of 10cm x4cm keeping 30cm distance in between two double row and four different levels of NPK fertilizer viz: F_1-No fertilizer (Control); F_2- 50:80:90(NPK kg/ha) ; F_3-100:100:150 NPK kg/ha; F_4-150: 120:210 NPK kg/ha. Half dose of Nitrogen and full doses of phosphorus and potassium were applied as based dose. During earthing up operation the remaining half dose of nitrogen was spilted into three equal doses and applied at 30,45 and 60 DAS. The experiment was laid out in Randomized Block Design (Factorial) with three replications. The TPS variety HPS-11/67 was sown on 25th October 2010 at 0.5 cm depth in the finely well prepared bed and covered with well powdered and sieved FYM. Shade was provided till the germination of seeds; thinning and gap filling was done after two weeks of germination. Earthing up operation was carried out at 30, 45 and 60 DAS. Irrigation was stopped 10 days prior to cutting the

Table-1. No. of tuberlets / plant, weight of tuberlets/plant, total tuberlets weight/plot and yield of tuberlets/ha. as influenced by methods of sowing and different levels of NPK fertilizer.

Treatments	Number of tuberlets/ plant	Wt. of tuberlets/ Plant (g)	Tubelets wt./plot (kg)	Tuberlets Yield (q/ ha.)
Method of sowing				
M1-Single row method (20cmx5cm)	15.55	61.68	3.26	84.00
M2- Double row method (10 cm x 4 cm), 30cm between two rows.	14.12	57.00	2.92	75.80
SEm±	0.39	0.99	0.09	2.36
CD (P=0.05)	1.18	3.00	0.27	7.01
Levels of N:P:K (kg/ha)				
F_1-No fertilizers (N:P:K)	12.83	51.30	1.17	45.45
F_2-50:80:90 (N:P:K kg/ha)	14.33	57.30	3.17	82.33
F_3- 100:100:150 (N:P:K kg/ha)	17.10	67.40	3.78	98.18
F_4- 150:120:210 (N:P:K kg/ha)	15.06	61.20	3.65	94.80
SEm±	0.56	1.40	0.12	3.11
CD (P=0.05)	1.70	4.24	0.36	9.35
Interaction Effect (m x f)	*	*	*	*

haulms. Haulms were cut when crop was 90 days old and tuberlets was harvested 12 days later when tuber skin had hardened.

RESULTS AND DISCUSSIONS:

YIELD ATTRIBUTES:

The yield attributing characters of tuberlets were significantly influenced by the sowing methods as well as different levels of NPK fertilizers application. Perusal of the data in table-1 revealed that single row method of sowing recorded maximum number of tuberlets/plant (15.55) and also recorded maximum tuberlets weight (61.68 g/plant) respectively.

All the three levels of NPK treatments resulted into significant increase in number of tuberlets and weight of tuberlets per plant over control. Application of 100:100:150 NPK (kg/ha) recorded maximum

Table.2 (a): Interaction effect between methods of sowing and different levels of NPK fertilizers on number of tuberlets/plant.

Treatments	Levels of NPK fertilizers				Mean
	F_1	F_2	F_3	F_4	
M_1- Single Row	13.4	14.9	17.7	16.1	15.52
M_2- Double Row	12.2	13.7	16.5	13.9	14.07
Mean	12.80	14.30	17.10	15.00	--
SEm±	0.79				
CD (P=0.05)	2.39				

Table.2 (b): Interaction effect between methods of sowing and different levels of NPK fertilizers on weight of tuberlets (g)/plant.

Treatments	Levels of NPK fertilizers				Mean
	F_1	F_2	F_3	F_4	
M_1- Single Row	53.50	59.70	68.80	64.60	61.65
M_2- Double Row	49.00	54.90	66.10	57.8	56.95
Mean	51.25	57.30	67.45	61.45	--
SEm±	1.99				
CD (P=0.05)	6.03				

Table.2(c): Interaction effect between methods of sowing and different levels of fertilizers on tuber lets yield (q/ha).

Treatments	Levels of NPK fertilizers				Mean
	F_1	F_2	F_3	F_4	
M_1- Single Row	46.00	92.00	101.00	98.00	84.25
M_2- Double Row	44.00	72.00	95.00	91.00	75.50
Mean	45.00	82.00	98.00	94.50	--
SEm±	4.67				
CD (P=0.05)	14.02				

number of tuberlets (17.10) and maximum weight of tuberlets (67.40) g/plant) respectively which was significantly higher than the yield obtained from the other treatments. Remarkable improvement in both

number and weight of tuberlets per plant under this treatment might be owing to adequate supply of NPK fertilizers to the crop which resulted into more efficient utilization of major nutrient for better growth and development of tuberlets.

Interaction effect between methods of sowing and different levels of NPK fertilizers on number of tuberlets and weight of tuber- lets per plant were found significant (Table.2.a & b). Single row method with application of 100:100:150 NPK (kg/ha) recorded the highest number and weight of tuberlets/plant. This treatment was statistically superior to the other treatments.

YIELD OF TUBERLETS:

It was evident from the data that significant differences in tuberlets yield was recorded due to methods of sowing. Single row method of sowing recorded significantly higher tuberlets yield (84.0 q/ha) than double row method of sowing (75.8q/ ha). Lower tuberlets yield under double row method of sowing might be due to lesser tuberlets weight with increased plant density. This result can be corroborated with the findings of Dubey (2003).

The different levels of NPK fertilizer application had significant differences in tuberlets yield. All the fertilizer levels resulted into significant increase in tuberlets yield over control plot. Application of 100:100:150 NPK (kg/ha) recorded the highest tuberlets yield (98.18q/ ha) which was followed by the application of 150:120:210 NPK (kg/ ha). These two treatments were statistically superior to other fertilizer treatments. This observation might be due to supply of sufficient NPK fertilizers at right doses leading to better yield attributing characters as compared to the other treatments resulting into more tuberlets yield (Table.1)

CONCLUSION:

The single row method of sowing with 20 cm x 5 cm spacing and fertilizer level of 100:100:150 NPK (kg/ha) recorded maximum tuberlets yield (101 q/ha). Hence, this combination may be recommended for tuberlets production by using TPS under mid-altitude condition.

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INTEGRATED NUTRIENT MANAGEMENT IN POTATO (*Solanum tuberosum*).

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Abstract

An Experiment carried out at State Agriculture Research Station, Yisemyong, Mokokchung district, Nagaland revealed that integrated use of FYM @ 20 t/ha + NPK fertilizers @ 80:100:80 kg/ha gave significantly highest yield of potato which was comparable to FYM + Bio-stimulants and FYM + green manure.

INTRODUCTION:

Low productivity of potato in our state is mainly due to poor management of plant nutrients. Therefore, adequate application of manures and fertilizers and its management is very important to release the productive potential of potato. Under different soil conditions, a positive effect on growth and yield of potato was noticed by FYM application, while the recommended amount varied with different soil conditions and manure type (Ganel and Karadogan, 1993; Kara and Nachitarhan, 1999; Singh, 2000). Application of FYM in potato improved its performance and enhanced tuber yield (Beukema and Van der Zaag, 1990).

Potato responds well to integrated nutrient management such as mineral fertilizers with organic manures. This also improves efficiency of nutrient management system in potato production (Sharma *et al.*, 1988). Hence, nutrient management is an important factor responsible for increased yield and quality of tubers. In view of this, the present investigation was conducted to study the effect of different doses of fertilizers application and its integration with various organic nutrient sources on growth and yield of potato.

MATERIALS AND METHODS:

The experiment was carried out during Autumn season at state Agricultural Research Station (SARS), Yisemyong at an altitude of 1050 m above MSL. The soil of the experimental site was sandy clay loam in texture with a pH of 5.1 and EC 0.2 mmhos/cm, and high organic carbon (1.6 %). The total available

phosphorus and potassium content were 9.5 and 41.8 kg/ha respectively. The experiment was laid out in Randomized Block Design with 3 replications. The TPS tuberlets (TPS-11/67) was sown on ridges with a spacing of 50 cm x 20 cm row to row and plant to plant on 7th October' 2006. The experiment consisted of five treatments, viz.

T_1 : Control plot. No application of any fertilizer.

T_2 : Application of FYM @ 10 tonnes/ ha.

T_3 : Application of FYM @ 10 tonnes/ ha supplemented by foliar application of Bio plant stimulant @ 1.2 litres/ha at 35 DAS.

T_4: Application of FYM @ 10 tons per hectare supplemented by application of NPK @ 80:100: 80 kg/ha. 50% of nitrogen was applied 35 DAS and remaining NPK was applied as basal dose.

RESULTS AND DISCUSSIONS:

Table 1: Effect of different nutrient sources on growth and yield of potato tubers.

Treatments	No. of haulms	No. of tubers/ plant	Wt. of tubers/ plant (g)	Total tuber Yield (q/ha)
T_1- Control	1.8	8.7	391	185.7
T_2- FYM@10 tonnes/ha	1.9	12.5	435.3	237.8
T_3- FYM @ 10 tonnes/ha + appli cation of Bio-stimulants @ 1.2 litres/ha.	2.6	16.2	650	311.0
T_4- FYM @ 10 tonnes/ha + application of 80:100:80 NPK (kg/ha)	2.2	16.6	752	375.5
T_5- FYM @ 10 tonnes + Tithonea Green manure @ 10 tonnes/ha.	2.0	14.3	517	307.7
SEm ±	-	1.16	67.3	1.74
CD (P=0.05)	NS	3.8	210.7	5.68

NS: Non significant.

T_5: Application of FYM @ 10 tonnes/ ha supplemented by application of Tithonia leaves as green manure @ 10 tonnes/ha at 35 DAS. Timely intercultural operations was carried out during the whole crop season.

The cost benefit ratio was calculated by the ratio of gross returns to cost of cultivation, which can also be expressed as return per rupee invested.

GROWTH AND YIELD ATTRIBUTES:

The data pertaining to number of haulms/plant in the table-1 revealed that maximum number of haulms(2.6) was recorded from the treatment (T_3) where FYM 10 tonnes/ha was integrated with foliar application of Bio– plant stimulant @ 1.2 litres/ha . A comparable result was also recorded from T_4 and T_5 respectively (2.2 and 2.0 haulms/ plant). The lowest haulm/ plant (1.8) was recorded from the control plot.

Different nutrient sources produced significant effect on the Number of tuber per plant. The highest number of tuber per plant (16.6) and weight of tuber per plant (752 g) was obtained from integrated use of 10 tonnes FYM/ha. plus NPK (80:100:80 kg/ha) (T_4). This was followed by with application of 10 tonnes FYM plus application of Bio-plant stimulant (T_3). These two treatments Were statistically at par with each other and the lowest yield was recorded from unfertilized plot (T_1). Similar finding was also reported by Gunel and Karadogan (1993) and Kara and Nacitarhan (1999).

TUBER YIELD:

Tuber yield was significantly higher (375.5 q/ha) with application of FYM @ 10 tonnes and 80:100:80 kg/ha of NPK fertilizers (T_4). This was followed by T_3 (311 q/ha) and T_5 (307.7 q/ ha) respectively. The lowest tuber yield was recorded in control plot (185.7 q/ ha). The higher tuber yield maybe due to adequate nutrient supply from FYM and NPK fertilizers as suggested by Sharma et al. (1988).

ECONOMICS :

Table 2: Effect of different nutrient sources on gross return, cost of cultivation, net return (Rs/ha) and cost: benefit ratio.

Treatments	Gross return (Rs)	Cost of cult.(Rs)	Net return. (Rs)	Cost: benefit ratio
T_1- Control	55,710	33,300	22,410	1:1.67
T_2- FYM@10 tonnes/ha	71,340	39,600	31,740	1:1.80
T_3- FYM @ 10 tonnes/ha + application of Bio-stimulants @ 1.2 litres/ha.	93,300	40,304	52,996	1:2.30
T_4- FYM @ 10 tonnes/ha + application of 80:100:80 NPK (kg/ha)	1,12,650	44,916	67,734	1:2.50
T_5- FYM @ 10 tonnes/ha + Tithonia Green manure @ 10 tonnes/ha.	92,334	41,800	50,534	1:2.20

- Cost of seed @ Rs.20/kg.
- Cost of Urea @ Rs.10/kg
- Cost of Bio– FYM @Rs. 300/ tonne
- Cost of Bio–stimulants @ Rs.210/500ml
- Price of potato @Rs. 300/q.
- Man days work @Rs. 300/day.
- Cost of DAP @ Rs.10/kg
- Cost of MOP @ Rs.10/kg

The economic analysis (Table-2) indicated that, treatment (T_4) which was an integrated application of FYM and NPK was found to be economically beneficial for potato cultivation in terms of total net income Rs. 67, 734 and cost benefit ratio of 1: 2.5. A comparable result were also obtained from treatment T_3 and T_5 which gave a net profit of Rs. 52, 996 and Rs. 50, 534 with cost benefit ratio of 1:2.3 and 1: 2.2 respectively.

CONCLUSION:

The above study shows that integrated use of FYM + inorganic NPK fertilizers gave significantly higher yield of potato which was comparable to FYM + Bio-stimulants and FYM + green manure. Therefore, considering the adverse effect of inorganic fertilizers on health and environment, use of FYM integrated with organic product like bio-plant stimulant or green manure which can equally produce substantial yield of potato per unit area.

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EFFECT OF DIFFERENT DATES OF SOWING ON GROWTH AND YIELD OF SOYABEAN [Glycine max (L.) Merril]

T. Supongmar Longchar, Mathung Odyuo & L.Maongsang Longkumer.

Abstract

Field experiments was conducted at State Agriculture Research Sub-Station, Wokha district, Nagaland during kharif season of 2007,to determine the optium date of sowing which revealed that the highest seed yield of soybean (12.33 q/ha) was obtained with 21st June sowing.

INTRODUCTION:

Cultivation of soybean [***Glycine max*** **(L.)** merril.] is gaining importance in Nagaland for its multipurpose utilization for preparation of different food items. Though, this crop is traditionally grown in almost every part of Nagaland, however, it is grown in a more larger scale in Zunheboto District.

Consequently its productivity is low due to various factors of which, changing weather parameters has a marked influence on its growth and yield. Date of planting greatly affects the crop growth, yield attributes (Raymer and Bernard, 1988) and seed yield (Shanthaveera Bhadraiah et al., 1986). Since information on the effect of planting date on the growth and yield of soybean is meager in Wokha District, the present investigation was carried out to determine the optimum date of sowing.

MATERIALS AND METHODS:

A field experiment was conducted during kharif season 2007 at the State Agricultural Research Sub-Station Wokha,

located at 1310 m above mean sea level. The soil of the experimental site was sandy clay loam in texture, acidic in reaction (pH 5.25), with electrical conductivity (0.2mmhos/cm), high Organic Carbon content (1.75%), low in available phosphorus (9.5 kg/ha) and low in available potassium (71.65 kg/ha). The experiment consisted of 8 different planting dates at 7 days intervals viz: T_1= sown on 14th June, T_2= sown on 21st June, T_3= sown on

28th June, T_4= sown on 5th July, T_5= sown on 12th July, T_6= sown on 19th July, T_7= sown on 26th July and T_8= sown on 2nd August.

The same treatments were replicated thrice in a Randomized Block Design. Soybean local cultivar (small size) was taken as test crop sown at 30 cm x 15 cm spacing.

Basal application of 20kg N was applied as starter dose during final land preparation in all the plots. All the parameters were recorded during harvest time except number of nodules per plant which was taken at 60 days after sowing.

RESULTS AND DISCUSSIONS:

Table: Effect of different dates of sowing on growth characters, yield attributes and yield of Soybean.

Treatments	Plant height (cm)	No.of pods/ plant	100 seed wt. (g)	Grain yield (Kg/ha)
T_1= sown on 14th June	67.86	38.2	6.6	716.6
T_2= sown on 21st June	68.26	51.6	7.6	1233
T_3= sown on 28th June	77.96	43.4	8.8	911
T_4= sown on 5th July	67.53	39.4	8.3	876
T_5= sown on 12th July	62.0	34.6	6.5	816
T_6= sown on 19th July	58.96	16.4	5.0	616
T_7= sown on 26th July	42.86	11.6	5.0	450
T_8=sown on 2nd August	48.43	14.0	4.6	300
SEm ±	13.82	15.3	2.21	32.6
CD (P=0.05)	4.78	5.31	0.76	11.3

GROWTH CHARACTERS:

Different dates of sowing had significant affect on plant height of soybean. Maximum plant height (77.96 cm) was recorded from the seed sown on 28th June (T_3) which was comparable to the seed sown on 21st June (T_2), 14th June (T_1) and 5th July (T_4). the lowest plant height was recorded from the seed sown on 26th July (T_7) and 2nd August (T_8).

YIELD ATTRIBUTES AND YIELD:

Highest number of pods/plant (51.6)was obtained from the crop sown on 21st June (T_2) followed by the crops sown on 28th June (T_3), 5th July (T_4) and 14th June (T_1). Delay in

planting resulted into significant reduction of number of pods/plant. Highest value of 100 seed weight (8.8g)was obtained from the seeds planted on 28th June (T_3). Comparable result was recorded from planting on 5th July (T_4), 21st June (T_2) and 14th June(T_1). Further delay in sowing also affected the test wt. The lowest seed test wt. was recorded from the planting date of 2nd August (T_8).

Grain yield was significantly influenced by different planting dates. Maximum yield (1233kg) was obtained from the crop planted on 21st June (T_2) which was significantly superior over other planting dates. This can be attributed to production of maximum no. of pods/plant owing to favorable condition for its growth and development. Further delay in planting dates also reduced the grain yield. The lowest grain yield (300kg)was recorded from the planting done on 2nd August (T_8). Similar finding was observed by Ramesh and Gopalaswamy (1992) and further substantiated by the finding of Jasani *et al.*,1993.

With these results, we can conclude that higher seed yield of soybean can be obtained by sowing the crop around 21st June during Kharif season under Wokha District.

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EFFECT OF SOYBEAN AND MAIZE INTERCROPPING ON ITS GROWTH AND YIELD UNDER RAINFED CONDITION

T. Supongmar Longchar & L.Maongsang Longkumer

Abstract

A field experiment conducted at State Agriculture Research Station, Yisemyong, Mokokchung district, Nagaland to study the effect of soybean and maize intercropping showed that 2:3 row ratio significantly gave the highest profitable return.

INTRODUCTION:

Though intercropping is an age old practice, yet it still attracts worldwide attention owing to its yield advantage if the crops selected are compatible and grown with scientific production technology (Widely, 1979) . Intercropping at appropriate planting proportion offer greater scope for achieving higher yield as well as provides insurance against weather hazards and utilizes resources more efficiently (Paradkar *et al.*, 1993). Wider space available in between maize rows can be used more efficiently for intercropping legumes, etc. For achieving higher yield and net returns without hampering soil fertility status (Patra et al., 1999). Moreover legumes not only enrich the soil which fixes atmospheric nitrogen but also increases total production per unit area and time by providing bonus yields.

Since soybean crop is gaining importance as a high value crop in the state, the present investigation was carried out to develop an efficient soybean maize intercropping system to optimize row ratio and yield advantages to suit rain fed areas.

MATERIALS AND METHODS:

The present experiment was conducted during Kharif season under rainfed condition at SARS experimental farm,

Yisemyong which is located at an altitude of1050 m above msl. The soil was sandy clay loam with medium in organic carbon content(0.70 %), low in available P (6.0 kg/ha) and

available K (100.7 kg/ha) and acidic in reaction (pH 4.69). Application of FYM @ 10 mt/ha and inorganic fertilizer such as NPK (60:60:50 kg/ha) was applied during final land preparation as basal dose and 60 kg nitrogen was applied as top dress at 5 weeks after sowing (during knee height stage) of maize in all the treatments. The experiment consisting of 5 treatments was laid out in randomized block design with four replications. The treatment combinations were viz.

T_1 – Sole crop of Soybean (JS-335) at 30x20 cm spacing.

T_2- Sole crop of maize (Vijay) at 45x30 cm spacing.

T_3- Two rows of Soybean + one row of Maize (2:1).

T_4- Two rows of Soybean + two row of Maize (2:2).

T_5 - Two rows of Soybean + three row of Maize (2:3).

Both main and intercrop were sown on 19th June' 2006. Maize was harvested on 19th of September' 2006 and soybean on 19th October' 2006 respectively.

Land equivalent ratio was calculated by using the following notations and the expression can be written as;

$$LER = LA + LB = (Ya)/(SA) + (Yb)/(SB)$$

$$= \frac{\text{Mixture yield of soyabean}}{\text{Pure crop yield of soyabean}} + \frac{\text{Mixture yield of Maize.}}{\text{Pure crop yield of Maize}}$$

RESULTS AND DISCUSSION:

Table. 1: Effect of row ratio on yield and economics of Soybean + Maize intercropping.

Treatments (Row Ratio)	Grain yield (q/ha)		Soybean equivalent yield (q/ha)	Land equivalent ratio	Gross return (Rs./ha)	Net return (Rs./ha)	Cost benefit or profit per investment
	Sole	Inter-crops					
T_1=Sole crop , Soybean	15.71	-	15.71	1.00	23,565	6,665	1:1.39
T_2=Sole crop, Maize	40.06	-	18.69	1.00	28,042	11,609.5	1:1.74
T_3=Soybean + Maize (2:1) row ratio	9.35	20.83	19.07	1.114	28,606	12,173.5	1:1.80
T_4=Soybean + Maize (2:2) row ratio	4.04	34.41	20.09	1.115	30,147	14,068	1:1.87
T_5=Soybean + Maize (2:3) row ratio	3.75	35.46	20.29	1.133	30,447	14,367	1:1.89
C.D. at 5 %	NS	NS	NA	NA	NA	NA	NA

- NS= Not significant
- NA= Not Analysed
- Labour cost= Rs.100/ manday work.
- Price of soyabean= Rs.15/ kg
- Price of Maize =Rs. 7/ kg.

YIELD:

Observation on grain yield (Table.1) showed that under all intercropping patterns of soybean and maize, yield decreased dramatically as compared to respective sole crops. However, magnitude of reduction in yield varied among different intercropping patterns. Similar findings were reported by Pandey *et al.*,(1999). The highest soybean yield was recorded with paired rows of soybean + a single row of maize (9.35 q/ha) in T_3, followed by treatments T_4 & T_5. More number of soybean plants/unit area and lesser competition for space and nutrient might be the probable reason for higher soybean yield under this system. This result confirmed the findings of Dubey *et al.*, (1995).

Maize yield under all the intercropping pattern also decreased compared to sole maize. Higher maize yield was obtained from treatment (T_5); paired row of soyabean + three rows of maize (35.46 q/ha) and closely followed by treatment (T_4); paired rows of soybean + paired rows of maize. The higher grain yield might be due to more number of maize plants/unit area and more efficient utilization of natural resources. Similar result was reported by Koranne, (1993).

SOYABEAN EQUIVALENT YIELD:

Differences were obtained in soyabean equivalent yields due to different intercropping pattern of soyabean + maize. All the intercropping patterns had more soyabean equivalent yield compared to sole soyabean. Among the different intercropping patterns, the highest soyabean equivalent yield (20.29 q/ ha) was under treatment (T_5) paired rows of soyabean + three rows of maize which was closely followed by treatment (T_4) paired rows of soyabean + paired rows of maize (20.09 q/ ha) and treatment (T_3) paired rows of soyabean + Single row of maize (19.07 q/ ha) .

LAND EQUIVALENT RATIO (LER):

LER indicated the relative land area under sole crop required to produce same yield level as obtained with a particular intercropping pattern. LER was always higher under all intercropping pattern as compared to sole crop. This suggest that all intercropping patterns of soyabean + maize were advantageous over sole crop.

The highest LER was recorded under paired rows of soyabean + 3 rows of maize (1.133) . It implied that this intercropping pattern was the most biologically efficient in utilizing an area compared to other intercropping patterns. Besides the above result, intercropping pattern of paired rows of soyabean + paired rows of maize (T_4) and paired rows of soyabean + single row of maize (T_3), were also found to be promising for higher LER values (1.115 and 1.114) respectively. This result corroborate with the findings of Pandey et al., (1999).

MONETARY RETURNS (ECONOMICS):

Gross return, net returns and cost-benefit ratios have been presented in Table-1. All the intercropping patterns of soyabean + maize gave higher gross return, net returns and cost: benefit ratio compared to sole crop except net returns and cost benefit ratio under treatment (T_3) (paired rows of soyabean+ single row of maize).

Among all the intercropping patterns of soyabean and maize, two rows of soyabean + three rows of maize recorded the highest net return (Rs. 14,367) followed by two rows of soyabean + two rows of maize (Rs.14,068). Two rows of soyabean + one row of maize recorded a net return of Rs. 12,173.5/ ha.

Similarly, the highest cost : benefit ratio was also recorded in two rows of soyabean + three rows of maize (1:1.89). This was followed by two rows of soyabean + two rows of maize from monetary point of view. This result coincided with the finding of Waghmare and Singh, (1982).

CONCLUSION:

Based on the above findings, it could be concluded that for achieving the highest total yield and monetary returns from intercropping of soyabean and maize under rainfed condition in mid altitude of Nagaland,

the intercropping pattern of paired rows of soyabean + three rows of maize or paired rows of soyabean + paired rows of maize maybe adopted instead of planting sole crop.

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DETERMINATION OF OPTIMUM DATE OF SOWING OF FABA BEAN (*Vicia faba*)

T. Supongmar Longchar & N. Tekatushi Ao

Abstract

Experiments conducted at State Agriculturl Research Station, Yisemyong, Mokokchung district, Nagaland,to determine the optimum date of sowing of faba bean the result revealed that 30th October sowing significantly gave the highest yield (1367 kg/ha.)

INTRODUCTION :

Faba bean (***Vicia faba*** L.) is a non- traditional legume pulse crop mostly cultivated in Rabi season by few farmers in Nagaland. It can be grown under a wide range of agro climatic conditions even with low agro-inputs. However, the present production level and area coverage is very negligible despite its good food value and high protein content. There is an urgent need to popularize this potential crop. Therefore, the present study was carried out to investigate the effect of different dates of sowing and to determine the optimum date of sowing since detail information on this aspect is unavailable.

MATERIALS AND METHODS :

A field experiment was carried out at the State Agricultural Research Station (SARS) , Yisemyong during winter season of 2006, at an altitude of 1050 m above MSL . The soil in the experimental area was sandy clay loam in texture with a pH 5.0 and electrical conductivity of 0.3 mmhos/cm, high organic carbon content (1.2 %), low in available phosphorus (10.0 kg/ha.) and medium in available potash (122.0 kg/ha). The trial compared six different sowing date with seven days interval from 16th Oct. to 20th Nov' 06. A basal dose of 20 kg N/ha in the form of urea was applied uniformly in all the plots. Sowing of seed was done at a spacing of 40 cm X 15cm row to row and plant to plant in randomized block design which was replicated thrice and inter-cultural operations were done whenever necessary.

Table 1. Effect of different sowing date on seed, yield, growth and yield attributes of Faba bean.

Sowing dates	Seed yield (kg/ha)	100 seed weight (g)	No. of pods/plant	Plant height (cm)	No. of branches/plant
16th Oct.	974	27.3	17.0	47.26	1.6
23rd Oct.	1283	31.86	22.66	50.6	1.6
30th Oct.	1367	33.76	27.26	53.9	2.0
6th Nov.	1066	28.8	22.2	48.13	1.6
13th Nov.	908	27.03	15.5	44.8	2.0
20th Nov.	835	27.06	15.8	41.0	2.1
CD (p=0.05)	228.8	2.27	NS	NS	NS
S. Em ±	0.72	0.72	-	-	-

*NS – Non Significant.

RESULTS AND DISCUSSION:

EFFECT ON SEED YIELD :

Sowing of crop on 30th October resulted in production of maximum grains (1367 kg/ha). A comparable yield was also obtained from 23rd October sowing. These two sowing dates were significantly higher than the remaining sowing dates. The lowest grain yield was recorded from the 20th Nov sowing. The higher grain yield produced from 30th October sowing might be due to the adequate soil moisture and also less disease and pest infestation. A similar result was also reported by Kurmawanshi *et al.*, (1994).

EFFECT ON GROWTH CHARACTERS:

Plant growth in terms of plant height at harvest was not significantly influenced by different sowing dates between 16th Oct and 20th Nov. However, maximum plant height was recorded from the 30th October sowing date (53.9cm) and lowest plant height (41 cm) was obtained from 20th November sowing. There was no significant effect on number of branches/plant, however the maximum number of branches per plant was produced by the 20th November sowing.

EFFECT ON YIELD COMPONENTS :

There was no significant effect in respect of number of pods/plant. However, maximum number of pods/ plant was produced from 30th October sowing as compared to other dates of sowing. This parameter shows declined trend with either early or delay in sowing than the 30th October sowing. This findings is in conformity with the finding of Mohamed (1986), Gorashi (1987) and Salih (1989) who reported that superiority in growth and yield parameters owing to early sowing than November sowing contributed to higher yield.

CONCLUSION :

From the above field experiment it can be concluded that faba bean can be sown on the last part of October for better grain yield under mid-altitude condition in Nagaland.

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PERFORMANCE OF DIFFERENT VARIETIES OF TPS (TUBERLETS) AND SEED TUBER FOR POTATO PRODUCTION

T. Supongmar Longchar & L. Nungsang Jamir.

Abstract

A field experiment conducted at State Agriculture Research Station, Yisemyong, Mokokchung district, Nagaland to evaluate the performance of different varieties of potato tuberlets revealed that TPS tuberlet HPS-7/67 recorded the highest marketable yield of ware potato.

INTRODUCTION:

Potato ***(Solanum tuberosum* L.**)production through seed tuber is expensive and has many constraints. The major limitation is non availability of good quality seed tubers. The production of tuberlets from TPS during first season and its subsequent utilization as seed for potato production in the next season maybe the remedy for this problem. Therefore, keeping this in view, an investigation was carried out to evaluate the performance of TPS tuberlets against the traditional seed tuber of potato.

OBJECTIVES:

1. To Evaluate the best suitable tuberlets for potato production.
2. To study the yield and tuber quality.
3. To replace the traditional seed tubers by TPS tuberlets.

MATERIALS AND METHODS:

The experiment was conducted at SARS, Yisemyong. The soil of the experimental site was sandy clay loam in texture with a pH of 5.00 and EC of 0.2 mmhos/cm, high organic carbon content (1.3%). The total available phosphorus and potassium content was 10 and 120 kg/ ha respectively. The experiment was laid out in RBD with 5 replications. FYM @ 10 tonnes/ ha was applied at the time of final land preparation. The sprouted three varieties of TPS tuberlets viz. HPS 7/67, HPS 11/67 and HPS 1/13 and seed tuber of Kufri Jyoti were planted on the 7th October 2005 at a spacing of 50cm x 15 cm by ridge and furrow methods. The tubers were harvested on the 28 th of January' 2006.

Table-1: Performance of TPS tuberlets varieties and seed tuber of Kufri Jyoti on the Yield attributes and tuber yield.

Treatment	No. of tubers/ plant	Av. Wt of tubers /plant(gm)	Marketable yield of tubers (q/ha)	Total yield of tubers (q/ha)	Percentage of damage
K. Jyoti (Local check)	8.16	196.3	73	124.6	70.6
HPS 7/67	19.24	528.9	283.7	335.8	18.36
HPS- 11/67	22.2	578.6	277.7	367.3	32.26
HPS- 1/13	19.9	513.3	252.7	325.9	28.96
CD (p= 0.05)	6.79	62.49	102.5	114.6	-

RESULTS AND DISCUSSIONS:

From the above table, it clearly indicates that all the three TPS tuberlets produced higher values of number of tubers/plant, average weight of tubers, marketable and total tuber yields. Maximum yield was recorded from HPS-11/67 . However the highest marketable yield (283.7 q/ha) was from HPS-7/67. This was due to less percentage of damage of tubers by pests and diseases in the variety. The major reason for poor yield in Kufri Jyoti was due to late blight and pests infestation on the crop.

CONCLUSION:

Since the use of TPS tuberlets for potato production is more advantageous than traditional system of potato cultivation in many aspects, use of TPS tuberlets should be recommended to the farmers for potato production.

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EFFECT OF SPLIT APPLICATION OF NITROGEN ON PADDY (*Oryza sativa*) AT DIFFERENT GROWTH STAGES.

Renbomo Ngullie

Abstract

A field experiment conducted at State Agricultural Research Station, Yisemyong during 1996 showed that split application of N (four split doses at basal + tillering + boot leg + panicle initiation) significantly gave the highest grain yield (36 q/ ha).

INTRODUCTION:

The growing concern over energy shortage and the consequent escalation in fertilizer prices in recent years have generated serious interest in the efficient and balanced use of fertilizers for major crops like paddy, where fertilizer use efficiency is very poor. Urea is the principle source of Nitrogen now being used in India. The losses of N from urea is very high in rice due to factors like poor management and the recovery of N being generally very less under average rice farming situations in India. Optimization of split application of N as urea in relation to growth stages of paddy is the method being suggested for improving the N-use efficiency. Therefore, the present experiment was carried out to find the best utilization of N at different stages of growth of paddy.

MATERIALS AND METHODS:

The experiment was conducted at State Agricultural Research Station, Yisemyong during 1996. There were 5 main treatments viz. T_0 (Control), T_1 (N full dose as basal application at the time of sowing), T_2 (N split into two doses, basal + tillering stage), T_3 (N split into three doses, basal + tillering + boot leg formation) and T_4 (N split into four doses, basal + tillering + boot leg + panicle initiation). Nitrogen was given at the rate of 150g/plot. The crop was laid out in Randomize Block Design with three replications. The plot size was 7.5 sq m. The paddy (var. Sungmang tsuk) was sown on 23rd April 1996 in line.

Table : Effect of Nitrogen on paddy at different growth stages.				
Treatments	Plant height (cm)	Tillers (No/hill)	Yield (kg/plot)	Yield (q/ha)
T_0	155	4	1.32	17.6
T_1	160	6	1.73	23.11
T_2	162	6	2.03	27.11
T_3	168	7	2.55	34.0
T_4	170	8	2.7	36.0
CD at 5 %	-	-	0.20	2.71

RESULT AND DISCUSSION :

The growth and yield parameters are given in the above table. Plant height and tillers/hill(170 & 8) has increased when nitrogen was applied at basal, tillering stage, boot leg formation and at panicle initiation. Pali et at. (1985) also reported that plant height and productive tillers were remarkably superior when N was applied half at sowing and half as foliar to full as foliar.

Similarly, yield also increased (36 Q/ha) significantly when N was applied at all the growing stages. Sharma and Agarwal (1982) also reported a significantly higher grain yield when urea was applied in 3 split doses as compared to single or 2 split applications. The increase in growth and yield may be due to supply of N at different growth stages where optimum intake of N by paddy plants occurs and minimum leaching of N was allowed when N is applied in split doses. Nevertheless, the overall growth (plant height and tiller/hill) and yield were higher in treated plots as compared to control.

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EFFECT OF SOWING DATES ON GROWTH AND YIELD OF GREEN GRAM(*Vigna radiata* (L) DURING KHARIF SEASON.

Lanunochetla

Abstract

Field Experiment was conducted at SARS, Yisemyong with a soil texture of sandy clay loam to study the effect of different sowing dates on growth and yield of mungbean during Kharif season in the year 2008. The effects of four dates of sowing (30th June, 7th, 14th and 21st July) were studied on K.851 variety. The crop sown on 14th July recorded the highest yield of 54.0 kg/ha which was significantly higher than the crop sown on 30th June with an yield of 39.3 kg/ha, 7th July (44.2kg/ha) and 21st July (19.0 kg/ha). Lower yield under earlier sowing was the result of more vegetative growth than reproductive growth and under delayed sowing, reduction in plant height, no. of pods/plant, 100 seed weight and total grain yield were observed.

INTRODUCTION:

Mungbean is an important food legume or pulse crop cultivated throughout India. It is one of the fastest growing pulse crops which matures in 60-80 days depending upon cultivars and climate. It can be grown during summer as well as during Kharif season. Among food legumes, Mungbean occupied a prominent place in India and presently grown in 3.1 Million ha. of area (Raman and Idnani, 2007). The grain yield may vary with the optimum time of sowing which may further vary with the location. Therefore, field experiment was conducted to study the grain yield under different dates of sowing in Yisemyong condition.

MATERIALS AND METHODS:

The field experiment was conducted at SARS Yisemyong which is located at 1050m above MSL to study the effect of different sowing dates on growth and yield of Mungbean during Kharif season, 2008. The soil of the experimental site was sandy clay loam with a pH of 6.08, testing high in available Organic Carbon content (1.56%), low in available phosphorus (5.00 kg/ha) and potassium (62kg/ha). The treatment consisted of four dates of sowing which was replicated four times and laid out in RBD. The sowing was done with a row spacing of 30 cm and plant to plant spacing of 10 cm. During land preparation, FYM @ 2kg/Sq. m was applied and all agronomic practices were done as and when required.

RESULTS AND DISCUSSIONS:

Table-1: Different date of sowing of Green gram (Vigna radiata (L)

Treatment	Plant height (cm)	Branch/ plant	Pods/ plant	Seeds/ pod	100-seed weight (g)	Grain yield/ plot (g)	Grain yield kg/ha
Date of sowing							
T_1 - 30thJune'08	26.6	3.7	7.9	9.9	2.1	62.9	39.3
T_2- 7th July '08	26.5	3.6	8.4	10.3	2.2	70.8	44.2
T_3- 14th July'08	26.3	3.2	9.6	10.7	2.7	86.3	54.0
T_4- 21st July'08	24.8	3.0	7.8	9.2	1.9	30.4	19.0
CD at 5%	NS	NS	NS	0.940	0.238	15.653	
SE m ±	-	-	-	0.29	0.07	4.893	

Table I:- Yield traits and grain yield of mungbean as influenced by date of sowing.

The plant height of green gram from Table-I showed that the 30th June sowing (T_1), the 7th July sowing (T_2) and the 14th July sowing (T_3) all gave a similar result of 26.6cm, 26.5cm, 26.3cm respectively except the 21st July sowing (T_4) which produced a slightly shorter plant height of 24.8cm.

All treatments gave almost similar results in number of branches per plant. T_1 (3.7) was slightly superior to T_2 (3.6), T_3 (3.2) and T_4 (3.0) but all were statistically non significant to each other.

The number of pods produced per plant was more in T_3 (14th July sowing) with a mean of 9.6 followed by T_2 (7th July sowing), T_1 (30th June sowing) and T_4 (21st July sowing) with a mean of 8.4, 7.9 and 7.8 respectively. All the treatments were non significant to each other.

A significant result was obtained from **Table-I** where T_3 (10.7)

produced more number of seeds/pod followed by T_2 (10.3), T_1 (9.9) and T_4 (9.2). T_1, T_2 and T_3 was statistically at par to each other except T_4 which gave the lowest numbers of seeds/ pod.

The weight of 100-seed weight per plot gave a significant result which showed that T_3 was most superior with a mean of 2.7 gm and gradually decreased in T_2 (2.2gm), T_1 (2.1 g), and T_4 (1.9 g). The T_3 was statistically significant than the other treatments. T_1 and T_2 were at par to each other but T_4 gave the lowest count. The present findings on 100-seed weight was in conformity to the observation of Kumar (1991) who reported that delayed in sowing decreased 100-seed weight in green gram.

From table-I, the crop sown on the 14th July (T_3) gave significantly higher grain yield (86.3 g) than the crops sown on the 30th June (T_1), the 7th July (T_2) and the 21st July (T_4) with a mean of 62.9 gm, 70.8 gm and 30.4 gm respectively. This finding has been supported by the findings of Singh et.al. (2003) who reported from Punjab that 12th-24th July is the optimum time of sowing green gram. Further, the yield decreased in T_2 and T_3 and a drastic decline in T_4 was in conformity to the findings of Singh and Sekhon (2002) who reported that with delayed sowing, grain yield decreased considerably. It was also reported that the best time of sowing of Mungbean was Mid July in Madhya Pradesh (Sharma et al. 1989) and Rajasthan (Siag and Gaur 1995).

CONCLUSION:

From this study it was revealed that the general yield performance was below average, as the crop was damaged by heavy rain during maturity stage consequently affect on yield. Therefore it may be concluted that green gram can be cultivated during winter season for better yield in our situation.

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RESPONSE OF SOYBEAN (*Glycine max*) TO DIFFERENT NUTRIENT SOURCES.

T. Supongmar Longchar and N. Tekatushi Ao

Abstract

Experiments conducted at State Agricultural Research Station, Yisemyong, Mokokchung district, Nagaland during 2008 to study the response of soybean to different nutrient sources showed that application of NPK @ 20:30:60kg/ha (T4)significantly resulted into the highest grain yield (11.84 q/ha) and also gave the highest net return.However,application of biofertilizer, Azospirillium gave highest cost benefit ratio (1:1.65)

INTRODUCTION:

In view of escalating price, less availability of chemical fertilizer, and also concerning healthy environment, there is a strong need to switch over from inorganic fertilizer to organic/ Bio-fertilizer for eco-friendly and economic cultivation of soybean. Bio-fertilizer such as Phosphotica for phosphate solubilizing bacteria and Azosperellium which are commonly used for soybean production , have an enormous potential to fix atmospheric Nitrogen and also have the capacity to solubilize and mobilize phosphorus and micronutrients present in non-available form in the soil (Dubey, 1998). Use of bio-fertilizer as a source of nitrogen and phosphorus can minimize dependence on chemical fertilizer (Dubey, 1992). Considering the above facts in view, the present investigation was therefore undertaken to evaluate the performance of inorganic fertilizer and bio-fertilizer and its economic benefit for the cultivation of soybean.

MATERIALS AND METHODS:

A field experiment was conducted during the rainy season (Kharif) of 2008 at State Agricultural Research Station, Yisemyong. The soil of experimental field was sandy clay loam in texture having soil reaction (pH 5.00) and Electrical Conductivity (0.1 mmhos/cm) having medium organic carbon content (0. 74 %), medium in available phosphorus (14kg/ha) and low available potassium (67.2 kg/ha). The experiment consists of 7 treatments

such as Control (T_O), Nitrogen 20kg/ha (T_1), Phosphorus 60kg/ha (T_2); Potassium 60kg/ha (T_3); NPK, 20:30:60kg/ha (T_4); Phosphotika 800g/ha (T_5); Azospirillium 800g/ha (T_6). The Bio-fertilizer was applied as seed treatment @ 10g/kg of seed. The NPK was applied as basal dose. The experiment was laid out in Randomized Block Design with 3 replications. Soybean VL-335 was sown on 23rd June in plot size of 3.5 x2m at 40 cm row spacing and 15 cm plant spacing. All the parameter was recorded at harvest except number of nodules per plant which was taken at 60 days after sowing. Cost of cultivation was calculated from land preparation upto harvest, cleaning and bagging of seeds.

RESULTS AND DISCUSSIONS:

Table-1:- Effect of Nitrogen, Phosphorus, Potassium Phosphotika and Rhizobium on growth, yield attributes and yield of soybean.

Treatments	Plant Height (cm)	No. of Nodules/plant	100 grains wt (g)	Grain yield q/ha	Response %
T_o	44.9	63.6	6.8	7.0	
T_1	50.1	65.3	7.1	8.9	28.1
T_2	46.3	70.6	7.1	10.26	46.5
T_3	45.4	71.6	7.6	10.74.	53.5
T_4	50.6	68.6	7.8	11.84.	69.1
T_5	45.7	74.6	7.2	9.26	32.2
T_6	48.4	76	7.4	10.30	47.1
CD(P=0.05)	NS	NS	NS	224	

Number of nodules/plant was improved in both the two bio-fertilizer treatments over other inorganic fertilizer and control plot. Maximum nodules per plant was recorded from Rhizobium treatment (T_6) followed by Phosphotica treatment (T_5) over Control (T_o). Reduction in number of nodulation in remaining treatments except in control which may be due to mineral fertilizer which are responsible to suppress nodulation due to affect of micro organism activities in the soil.

This finding was in conformity to Dart (1974).Differences in plant

height was also recorded. Maximum plant height was obtained under applied NPK (T_4) and nitrogen applied plot (T_1) as compared with other treatments and the lowest plant height was obtained from control plot (T_o). The increase in plant height was due to more availability of NPK nutrients through chemicals. The result conformed the findings of Alzawadi (1986).

There were marginal differences of 100-seed wt. in all the treatments except Control plot (T_o). Highest seed test Wt. (7.8g) was recorded under (T_4) and comparable results obtained from remaining treatments except Control (T_o). Grain yield revealed significant differences among the treatments. Maximum grain yield (11.84 q/ha) was recorded from application of NPK (T_4) which was more significant than the treatments of phosphorus (T_2); potassium (T_3) and application of Rhizobium (T_6). The lowest grain yield was obtained from control (T_o) plot. The increase in yield was 69.1% over control.

ECONOMICS:

Table: 2:- Economic of soybean as influenced by inorganic fertilizer and bio-fertilizer application.

Treatments	Cost of cultivation (Rs/ha)	Gross income (Rs/ha)	Net return (Rs/ha)	Cost. benefit ratio
T_o	12000	14000	2000	1:1.16
T_1	12830	17934	5104	1:1.39
T_2	13400	20520	7120	1:1.53
T_3	13200	21492	8292	1:1.62
T_4	14830	23680	8850	1:1.59
T_5	12440	18520	6080	1:1.48
T_6	12440	20600	8160	1:1.65

Cost of seed = Rs 30/ kg
Cost of Urea = Rs 8/kg
Cost of MOP = RS 10/kg
Cost of Biofertilizer =RS 10/kg
Cost of Rock Phosphate = Rs 8/ kg
Man days work = RS 100/MDW/day
Sale of Soybean =Rs 20/kg.

Reference to Table-2, Net income showed remarkable differences among the treatments. The application of NPK fertilizer treatment (T_4) registered highest net return per hectare (Rs 8850) which was followed by treatment (T_3) and (T_6). The lowest net return (Rs 2000/ha) was recorded from control treatment (T_0). However, it was found that the highest cost benefit ratio (1:1.65) was obtained from Rhizobium applied treatment (T_6) which was followed by treatment (T_3) and (T_4), and the lowest cost benefit ratio (1:1.16) was obtained from control (T_0). The highest cost benefit ratio obtained from treatment (T_6) was due to low cost of bio-fertilizer, reducing cost of cultivation over other fertilizers treatment.

CONCLUSION :

It was concluded that cultivation of soybean could be done by using bio-fertilizer rather than by using inorganic fertilizer for eco-friendly cultivation as well as for economic production of soybean.

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EFFECT OF DIFFERENT METHODS OF SOWING AND WEED CONTROL MEASURES ON GROWTH AND YIELD OF DIRECT SEEDED UPLAND RICE (*Oryza sativa* L.)

T. Supongmar Longchar

Abstract

Field Experiment conducted at School of Agricultural Sciences & Rural Development, Medziphema, Dimapur district, Nagaland revealed that in upland direct seeded rice, sowing by dibbling significantly reduced weed incidence and application of Butachlor @ 1.5 kg/ha. + HW at 40 DAS resulted into highest net return and cost benefit ratio.

INTRODUCTION:

Rice is the staple food of Nagaland. The major inherent factors limiting crop productivity of rice in the state are rain fed cultivation system, poor nutrient availability and undulated topography. Besides these factors, certain management factors like proper method of sowing, appropriate weed management play an important role in productivity of upland rice in the state.

Farmers generally broadcast the seeds which leads to uneven plant stand and poor growth at early stage, offering opportunities for the weeds to grow vigorously that effect the yield and sometimes result into complete failure of the crop (Poonia, 1983). Keeping the above aspect in view, a field experiment was therefore undertaken with the following objectives-

1. To evaluate the methods of sowing.
2. To evaluate the adequate weed control measures.
3. To evaluate the economics of paddy cultivation.

MATERIALS AND METHODS:

This experiment was carried out in the Agronomy farm, SASRD, Medziphema , Nagaland during Kharif, 1999 with the treatment consisting of two methods of sowing and five weed control measures (table 1) under factorial Randomized block

design with three replications. The climate of the experimental site was sub tropical exhibiting high humidity and medium to high rainfall. The soil was sandy loam, acidic in reaction (PH 4.7), medium in available N (261kg/ ha), medium in phosphorus (14kg/ ha) and low in potassium (109 kg/ha). Rice cultivar " Leikhumo" was sown on 19th May. Two to three seeds per hill were dibbled in lines 20cm apart keeping plant to plant distance of 15cm. Farm yard manure @ 10 ton/ ha was applied at the time of final ploughing. Nitrogen @ 60kg/ha in the form of urea was applied in two equal splits half at the time of sowing and the remaining half at 40 days after sowing. A basal dose of 30kg P2 05/ ha in the form of single super phosphate and 30kg K20/ha in the form of muriate of potash was applied. The weedicide for weed control measure, Butachlor as pre emergence and 2,4-D as post emergence (20 DAS), were applied.

The major weeds of the experiments field were Agreatum conyzoides, Amaranthus virdis Borreria hispida, Chromolaena odorata, Digitaria sanguinalis, Euphorbia hirta, Mikania micrantha and Mimosa pudica.

RESULTS AND DISCUSSIONS:

Table-1: Effect of method of sowing and weed control measures on weed growth, yield attributes and yield of upland rice.

Treatment Method of Sowing	60 days after sowing			At Harvest			
	Weed population ($No./m^2$)	Weed dry wt (g/m^2)	No. of effective tillers/plant	No. of panicles/ m^2	No. of grains/ panicle	1000 grain wt (g)	Grains yield (Qtl /ha.)
Broadcasting	156.5	110.1	1.7	105.6	132.9	23.5	23.18
Dibbling	136.1	97.2	2.7	161.0	156.5	23.5	28.37
CD (P= 0.05)	NS	6.64	0.25	11.49	23.32	NS	4.33
Weed Control measures							
Butachlor @1.5 kg a.i+ 2,4-D	105.8	101.5	2.3	120.0	140.5	23.08	16.90
@1.0 kg a.i/ ha Butachlor @ 1.5 kg a.i+ 2,4-D	58.8	37.8	2.5	176.0	163.8	24.41	37.49
@1.0 kg a.i/ ha + HW at 40 DAS HW at 20 & 40 DAS	55.1	33.5	2.6	175.3	184.7	24.58	39.39
HW at 40 DAS	67	45.2	2.4	150	159.5	23.91	29.20
Weedy	444.8	298	51.4	45.3	75.1	21.75	5.89
CD (P= 0.05)	71.4	10.5	0.40	50.74	36.8	0.48	6.85

**** HW=H and weeding * DAS=days after sowing***

Dibbling method of sowing significantly reduced weed dry weight in comparison to broadcasting method at 60 DAS. Incase of weed population, significant variation was not observed at the same stage of crop growth (Table-1). Among the weed control measures, hand weeding twice ie. 20 and 40 days after sowing (DAS) reduced the weed dry weight in comparison to weedy and Butachlor + 2, 4-D. however, it was at par to Butachlor + hand weeding (HW) at 40 DAS . In case of weed population all the weed control treatment were at par with each other. Table (1) . These findings are in conformity with Patel *et al*.,(1997). The yield attributes were significantly higher in dibbling method of sowing in comparison to broadcasting. Table (1). Among the weed control treatments, the highest and the lowest number of effective tillers, panicles and grain/ plant was recorded in hand weeding twice and weedy treatment-respectively and all weed control treatments significantly differed from the weedy treatment. The highest grain yield (39.39 q/ha) was recorded in hand weeding twice (20 & 40 DAS) followed by Butachlor + HW at 40 DAS. Hand weeding twice and Butachlor + HW at 40 DAS were at par and had significantly higher grain yield in comparison to Butachlor + 2,4 D and 2,4-D + HW at 40 DAS which were at par with each other. This finding was in agreement with the findings of Singh and Prakash (1990). Who reported that the application of Butachlor @ 1.5kg/ha supplemented with one hand weeding at 25-30 DAS gave higher grain yield and was comparable to two hand weeding.

ECONOMIC ANALYSIS :

Economic analysis of the treatments revealed that dibbling method of sowing had more net return and cost benefit ratio in comparison to broadcasting (Table 2). Among the as compared to broadcasting method of sowing (Table-2). Among the weed control treatments, hand weeding twice at 20 and 40 DAS had highest net return ,but the cost benefit ratio was highest in Butachlor + HW at 40 DAS treatment followed by hand weeding twice and 2,4-D + HW at 40 DAS. Weedy check had the negative cost benefit ratio.

Table-2: Economic Analysis of the Treatments.				
Treatments	Cost of Cultivation (Rs.)	Gross return (Rs.)	Net return (Rs.)	Cost benefit ratio
Method of sowing				
Broadcasting	9,676	12,958	3,282	1:1.33
Dibbling	9,766	15,630	5,864	1:1.60
Weed control measures				
Butachlor 1.5 kg + 2,4-D 1.0 kg/ ha	9,269	9,569	300	1:1.30
Butachlor 1.5 kg + 2,4-D 1.0 kg/ ha + HW at 40 DAS.	9,719	20,670	10,951	1:1.12
2, 4-D 1.0 kg/ ha + HW at 40 DAS.	10,229	16,082	5,859	1:1.57
HW at 20 & 40 DAS	10,923	21,674	10,751	1:1.98
Weedy	8,473	3,476	-4,997	1:0.41

NB:

Butachlor 50 EC = Rs. 82/ lit.

2,4– D 50 EC = Rs. 150/ lit.

Price of grain = Rs. 500/ q.

Price of straw =Rs.25/ q.

Labour charge =Rs. 50/man day

CONCLUSION:

From this field experiment, it indicated that for cultivation of rain fed direct seeded upland rice, dibbling method of sowing and management of weeds by pre emergence application of Butachlor @ 1.5 kg/ ha supplemented with one hand weeding at 40 DAS was more profitable under lower agro– climatic conditions of Nagaland.

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EFFICACY OF VARYING NITROGEN LEVELS ON GROWTH AND YIELD OF MAIZE (Zea mays).

T. Supongmar Longchar & N. Tekatushi. Ao.

Abstract

A field experiment was conducted at State Agriculture Research Station, Yisemyong during Kharif season of 2010 under rainfed condition. The experiment revealed that each successive increase in nitrogen levels had significant effect on grain yield of maize with the highest recorded at 120kg N/ha. Increasing yield of maize with increasing nitrogen levels may be due to the resultant improvement in the yield attributes of maize such as cob length, grain weight per cob and shelling percentage. The highest net return (Rs 43,465) and cost benefit ratio (1:2.49) per hectare was also recorded with 120kg N/ha.

INTRODUCTION:

Maize (***Zea mays***) is one of the major coarse grain cereal crop grown in Nagaland. It is gaining importance particularly in rainfed areas because of its increasing demand for poultry and animals feeds. Maize crop have a great production potential under adequate soil fertility and suitable agronomic inputs. However, due to their exhaustive nature, they require more nutrients and have posed a great threat to long-term sustainability of crop production (Verendra and Ahlawat, 2004). Maize crop being heavy feeder of nutrients easily depletes soil nutrient especially nitrogen very extensively. Therefore, by supplementing nitrogen through inorganic sources will play a vital role in increasing the yield of maize. Keeping this in view, the present investigation was carried out to determine the optimum nitrogen level for maximum production of maize.

MATERIALS AND METHODS:

A field experiment was conducted at State Agricultural Research Station, Yisemyong under rainfed condition during Kharif season 2010. The soil in the experimental plots was sandy clay loam and acidic in reaction (pH 5.5), medium in organic carbon content (0.74 %), very low in available phosphorus (2.0kg/ha) and medium

in available potassium (120kg/ha). The experiment was laid out in Randomized Block Design with three replications and seven different treatments. The treatments are T_1= No Nitrogen; T_2= 20kg N/ha; T_3=40kg/ha;T_4=60kg N/ha; T_5= 80kg N/ha, T_6=100kg N/ha; and T_7= 120kg N/ha.

The soil was brought to a fine tilth and FYM @ 2.5 MT/ha was uniformly incorporated to the soil. Nitrogen in split doses as per recommended schedule and full doses of phosphorus and potassium (40 and 30kg P&K/ha) was applied into the respective plots. Nitrogen, Phosphorus and Potassium were supplied through Urea, Single Super Phosphate and Muriate of Potash. The seeds of Vijay composite maize was sown on 16-4-2010 at a spacing of 50cmx30cm. All the biometrical observations and yield parameters were recorded on 18-8-2010 at crop maturity. The total rainfall received during crop growth was 1698.9mm. All the experimental data were analyzed using standard statistical procedure. The shelling percentage was calculated by using the formula-

$$\text{Shelling percentage.} = \frac{\text{Grain wt.}}{\text{Cob wt.}} \times 100$$

The economic analysis was done on the basis of prevailing market prices of both inputs and the produce. Cost of urea @ Rs 10/kg; DAP @ Rs 12/kg; MOP @ Rs 12/kg, wages @ Rs 150/MDW; cost of seeds @ Rs 60/ kg and sale of seeds @ Rs 1200/Qtls.

RESULTS AND DISCUSSIONS:

Statistical analysis of bio metric and yield parameters showed significant results in plant, weight of cob, cob length and grain yield per plot. From the table-1, it was evident that application of 40kg N/ha (T_3) gave a higher plant height (285cm) than other treatments which were significant over the Control (T_1). Treatment T_4, T_5, T_6, T_7 and T_2 were found to be almost at par with T_3. However, it was observed that plant height could not produce positive impact on yield attributes and grain yield. Application of 120 Kg N/ha (T_7) gave higher length of cob (19.3 cm) than all the other treatments which were significant over T_1 & T_2. The increase in cob length might have influence grain weight and also shelling percentage. Thus, increase in yield parameters directly influence the grain yield. This result can be further substantiated with the findings of Ranjodh Singh (1983).

Table No. 1: Effect of varying nitrogen levels on growth and yield attributes of maize.

Treat-ments	Plant height (cm)	Weight/ cob(g)	Grain weight/ cob (g)	Cob length (cm)	1000- seed test weight(g)	Shelling percentage
T_1=N0	237.0	203.3	140	16.5	169	68
T_2=N20	263.2	223.3	153.3	17.0	173	68
T_3=N40	285	266.0	176.6	18.2	177	66
T_4=N60	281.6	270.0	173.3	18.1	174	64
T_5=N80	270.4	270.0	180	18.4	182	66
T_6=N100	266.5	247.0	183	18.5	183	74
T_7=N120	260.2	247.0	186	19.3	185	75
CD at 5%	22.5	.025	-	1.57	-	-
E.m ±	7.3	.0001	-	0.50	-	-

The grain yield per hectare (Table-2) showed that application of 120 Kg N/ha gave the highest grain yield of 60.4 q/ha (T_7**)** which was significantly superior over rest of the treatments. The lowest grain yield was recorded from the control treatment T_1 (45.5 q/ha). The highest grain yield was obtained from treatment T_7. This might be due to easy and greater availability and efficient utilization of nitrogen by the crop. Similar findings were also reported by Narayana Swamy *et al.*, (1994) and Balasubramanian *et al.*, (1995) .

ECONOMICS ANALYSIS :

Table No. 2. Effect of varying nitrogen levels on yield and economics of maize production.

Treatments	Yield Q/ ha	Gross in - come (Rs./ha)	Cost of cultiva- tion (Rs./ha)	Net income (Rs./ha)	Cost: Benefit ratio
T_1	203.3	54600	26475	28125	1:2.06
T_2	223.3	59280	26905	32375	1:2.20
T_3	266.0	62400	27345	35055	1:2.28
T_4	270.0	63120	27775	35345	1:2.27
T_5	270.0	64680	28215	36465	1:2.29
T_6	247.0	66240	28645	37595	1:2.31
T_7	247.0	72540	29075	43465	1:2.49
CD (P=0.05)	.025	-	-	-	-
S.Em±	.0001	-	-	-	-

Economics analysis of different treatments presented in table-2 revealed that the maximum net return (Rs. 43,465) and cost benefit ratio (1:2.49) was recorded from the treatment T_7 (120 Kg N/ ha) followed by treatment T_6 (100 Kg N/ha) with a net return of (Rs. 37,595) and cost benefit ratio of (1:2.31). The lowest net return (Rs. 28125) and cost benefit ratio (1:2.06) was obtained from T_1 where no nitrogen was applied.

Thus, the result revealed that application of 120 Kg N/ha nitrogen to maize showed a remarkable improvement in growth and yield attributes and gave more grain yield and better remuneration per unit area.

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RESPONSE OF MAIZE (Zea mays) TO NPK FERTILIZERS

T. Supongmar Longchar, N. Tekatushi. Ao, Mathang Odyuo & L. Moangsang Longkumer

Abstract

Experiments conducted at Agril. Research Sub-Station Wokha, located at 1230m above MSL during Kharif season, 2010. revealed that there was consistent increase in grain yield of maize with each increment of fertilization up to application of 70:60:50 (kg NPK/ha). The highest grain yield (65.25q/ha) as well as net return and C:B ratio was also recorded in this treatment (T_6). The higher grain yield can be attributed to adequate supply of available major nutrients to the crop which resulted into cumulative beneficial effect on growth and yield attributing characters and ultimately reflected in the grain yield of maize.

***Key words**: NPK fertilizers & economic feasibility*

INTRODUCTION:

Maize is an important cereal crop grown in Nagaland. This crop has exhibited high potential both in productivity as well as its utility. Because of its uniqueness for diverse use as well as responsiveness to inputs, maize has tremendous potential in ensuring sustainability and food security (Kumar 2009). Fertilizer management is one of the most important agronomic factors that effect yield of maize. Maize being a very exhaustive crop and heavy feeder of nutrient, the soil nutrient gets depleted very fast. Thus, low availability of nutrient in the soil affects the productivity of maize per unit area (Pursuhottam and Pure, 2001). Application of major nutrients through inorganic sources can boost maize production upto its maximum yield potential. However, no such experiment has been conducted earlier at Wokha (1310 m above MSL) under rainfed condition. Therefore, the present investigation was carried out to study the response of maize with varying levels of NPK fertilizers over the control plot and to determine optimum NPK requirement by the crop.

MATERIALS AND METHODS:

A field experiment was conducted at State Agricultural Research Sub-Station, Wokha located at 1230m above MSL. The soil in the experimental plots was sandy clay loam and acidic in reaction (pH-5.0) with medium organic carbon content (0.73%), very low available phosphorus (2.00kg/ha) and medium in available potash (150kg/ha).The experiment was laid out in randomized block design (RBD) with three replications and seven treatments. The treatments consist of T_1= No fertilizers; T_2= 30:20:10 NPK (kg /ha); T_3= 40:30:20 NPK (kg/ha); T_4 =50:40:30 NPK (kg/ha); T_5= 60:50:40 NPK (kg/ha); T_6= 70:60:50 NPK (kg/ha) and T_7= 80:70:60 NPK (kg/ha). The soil was brought to a fine tilth and FYM was incorporated into the soil uniformly @ 2.5MT/ha. in all the treatments. Half dose of N was applied as basal dose along with full doses of P & K into the respective plots in all the replications. The seeds of Vijay composite maize was sown on 9th April 2010 with a spacing of 50cmx30cm. The remaining half dose of N was applied on the 40th day after sowing when the crop attained knee height stage. All biometric observations and yield parameters were recorded on 19-08-2010 at the time of harvesting. The economic analysis was done on the basis of prevailing market prices of both inputs and the produce.

RESULTS AND DISCUSSIONS:

Table 1: - Effect of different NPK levels on Yield attributes and yield of maize:

Treat-ments	Plant height (cm)	Length of cob (cm)	Girth of Cob(cm)	Cob Wt. (g)	Grain Wt/cob (g)	No. of grain/ cob	1000 test Wt. (g)	Grain yield	
								Kg/ plot	q/ha
T_1=Control	185.8	12.51	15.20	107.3	66.7	177.0	173.3	1.65	26.5
T_2=30:20:10	229.0	16.10	16.20	187.3	130.0	258.0	181.0	3.10	49.5
T_3=40:30:20	214.1	16.50	16.40	188.0	116.7	413.0	202.0	3.15	50.25
T_4 =50:40:30	190.1	15.50	16.81	189.3	116.7	399.0	221.3	3.20	51.25
T_5=60:50:40	230.9	16.50	17.18	204.0	143.3	446.3	217.3	3.99	60.00
T_6=70:60:50	233.2	17.70	17.14	220.0	146.6	465.0	229.6	4.09	65.25
T_7=80:70:60	212.9	16.90	16.60	196.0	127.0	459.0	232.0	2.30	55.50
CD(P=0.05)	NS	2.54	NS	NS	NS	82.4	NS	1.28	20.25
S. Em±	-	0.69	NS	-	NS	26.7	NS	.42	6.00

Analysis of the data showed significant variation in length of cob, number of grains per cob and grain yield. The observations are presented in table-1 & table-2.

From the table-1, it is evident that application of NPK @ 70:60:50 kg/ha (T_6) produced the highest length of cob (17.70cm) over other treatments which was also significantly better over control. The increase in the length of cobs might have influenced both the number of grains per cob and the grain yield per unit area. Similarly, the number of grains per cob was highest (465 Nos) in T_6 followed by T_7 (459 Nos) and T_5 (446.3 Nos) which were at par with each other but all treatments were significant over T_1. The increase in number of grains per cob had a marked influence on the grain yield. The highest grain yield (65.25 q/ha) was recorded with application of 70:60:50 NPK kg/ha (T_6) followed by treatment (T_5).

Economics Analysis:

Table 2: Effect of different NPK levels on economics of maize production.

Treatments	Yield (Q/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Cost: Benefit ratio
T_1= Control	26.5	140	16.5	7050	1:1.28
T_2= 30:20:10(kg NPK /ha)	49.50	153.3	17.0	29983	1:2.00
T_3= 40:30:20 (kg NPK /ha)	50.25	176.6	18.2	27690	1:1.84
T_4=50:40:30 (kg NPK /ha)	51.25	173.3	18.1	27720	1:1.82
T_5 =60:50:40 (kg NPK /ha)	60.00	180	18.4	37064	1:2.00
T_6=70:60:50 (kg NPK /ha)	65.25	183	18.5	42182	1:2.16
T_7= 80:70:60 (kg NPK /ha)	55.50	186	19.3	29316	1:1.78
CD (P=0.05)	20.25	-	1.57	-	-
S. Em±	6.00	-	0.50	-	-

Urea= Rs.10/kg; *SSP=Rs.12/kg; MOP= Rs. 12/kg; Man day work= Rs. 150/MDW; Sale of seeds= Rs. 1200/Q; Cost of seed= Rs. 60/kg.

Perusal of the data in table-2 shows that maximum net return (Rs. 42,182) and cost benefit ratio (1:2.16) was recorded with application of 70:60:50 NPK kg/ha (T_6) followed by fertilizer application of 60:50:40 NPK kg/ha (T_5) with a net return of Rs. 37,064 and cost benefit ratio of (1:2.00) which was significant over control. The lowest net return and cost benefit ratio was obtained from the controlled plot. It was also observed that increase in doses of NPK up to 70:60:50 kg /ha (T_6) had increased the grain yield, but further increase in fertilizer dose beyond it showed adverse effect in the yield attributes as well as grain yield per hectare. The highest grain yield was attributed to adequate supply of major nutrients and its cumulative beneficial affect on the growth and yield attributing characters which had finally influenced the grain yield of maize. These findings are in agreement with those of Parmar & Sharma (2001).

The result clearly indicated that the application of major nutrients, NPK through inorganic fertilizer was found to be more productive and gave more remunerative return than non-fertilized plot under rainfed condition.

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EFFECT OF DIFFERENT SOIL pH RANGES ON GROWTH AND YIELD OF TORIA . (*Brassica campestris* L. var Toria).

T. Supongmar Longchar, N. Tekatushi Ao, L. Maongsang Lkr. & Khriesiezolie Kire.

Abstract

An Experiment conducted at State Agricultural Research Station, Yisemyong revealed that variation in soil pH markedly influenced seed yield of toria. It was observed that a pH range of 6.4 was the most optimum range to release the full yield potential of the crop.

INTRODUCTION:

Oilseeds are major Agricultural crops, next only to food grains. The existing oilseeds scenario in our state is far from satisfactory. The edible oil requirement of the state is meet mostly through imports. However, our state has immense potential, since large area of fallow lands are available. It is evident from various field trials that there is ample scope for enhancing productivity and production of oil seeds. Thus, improved production technology on oil seeds would be immensely useful for the farmers to increase oilseeds production (Munda et al., 2006). The growth and productivity of oilseed crop is greatly influenced by the levels of soil pH. The soil reaction in our state is acidic in nature. Proper management of acidic soil is necessary for sustaining oilseed production and productivity. Since no trials has been done on this aspect under our soil condition, the present investigation was carried out to determine the most optimum soil pH level for higher productivity of toria.

MATERIALS AND METHODS:

A field experiment was conducted during the Rabi season of 2009 at State Agricultural Research Station, Yisemyong. The soil of the experimental plot was sandy clay loam with high organic carbon content (4.3%), very low available P (3.00 kg/ha), medium in available K (215 kg/ha). The experiment was

laid out in Randomized Block Design (RBD), replicated thrice with 7 treatments. Viz.,T_1 = Original pH level (5.3), T_2 = Original pH level was raised to 5.4 by burning of stubbles and treatments T_3, T_4, T_5, T_6, and T_7, soil pH were raised to 5.9, 6.5, 7.1, 7.7, and 8.3 respectively by application of pre-determined amount of lime as per acid soil of India and liming (Manda Lital, 1982). Lime was applied a month before sowing. FYM @ 2.5 t/ha. and recommended NPK doses of 60:50:20 kg/ha was applied.

Half of the N and full dose of P and K were applied at the time of land preparation. The Toria variety, TS-36 was sown on 29/10/2009 and the crop was harvested in the middle week of February 2010. The experimental data was analyzed using standard statistical procedure.

RESULTS AND DISCUSSIONS:

Table: Effect of different soil pH on growth and yield of Toria.

Treatment		Plant height (cm)	Seed yield/ plant (g)	No. of seeds/ siliquae	Seed yield/ plot (kg)	Seed yield Q/ha
	Soil pH					
T_1	5.3 – Control	134.9	8.21	15.3	0.68	14.2
T_2	5.43 – Burned	143.2	12.63	17.8	0.86	16.1
T_3	5.9 –(2.25 Tonnes)	135.6	14.16	19.2	0.81	15.5
T_4	6.4 – (4.5 Tonnes)	138.6	14.16	19.5	1.08	20.1
T_5	7.0 – (6.75 Tonnes)	142.8	12.62	17.4	1.00	18.1
T_6	7.6 –(9.00 Tonnes)	142.6	12.26	17.4	0.88	17.2
T_7	8.2 -(11.25 Tonnes)	139.6	11.13	16.8	0.85	18.2
	C D (P=0.05)	NS	2.65			

There was no significant effect on plant height and No. of seeds/siliquae by different level of soil pH. However, maximum plant height was observed under soil burned condition (T_2). Lowest plant height was recorded from the control plot (T_1). Highest number of seeds per siliquae was recorded from treatment T_4 and lowest was obtained from control plot

(T_1). It was observed that there was a decline in plant height and No. of seeds/siliquae when soil pH was beyond pH 7.0. It is evident that variation in soil pH significantly influenced seed yield per plant. Maximum seed yield (20.1 q/ha) was recorded in treatment T_4 (pH 6.4) followed by treatment T5 (pH 7.0) . A comparable yield was also obtained from treatment (T_2, T_3 and T_6). Lowest seed yield was recorded from control treatment (T_1). The maximum seed yield per plant was obtained from T_4 and T_3 but maximum number of seeds per siliquae was recorded from T_4 (pH 6.4). The yield of Toria increased with increase in level of soil pH level up to 6.4. The higher yield was contributed due to maximum seed yield per plant recorded from the same treatment.

It can be concluded that the growth and yield of Toria was influenced by different level of soil pH. Hence, soil amelioration practices may be adopted for maintaining optimum soil pH level for maximum Toria seed yield.

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EFFECT OF MANUAL WEED CONTROL IN SOYBEAN [Glycine max (L) Merrill]

T. Supongmar Longchar , N. Tekatushi Ao & L.Maongsang Longkumer

Abstract

An experiment was conducted at State Agricultural Research Station, Yisemyong to evaluate the effect of manual weed control in soybean. The study revealed that three hand weedings at 15, 30 and 45 DAS (T_5) recorded significantly the highest grain yield (11.5q/ha) and also the highest net return (Rs. 16,580/-) and cost benefit ratio (1:1.60).

INTRODUCTION:

Cultivation of soybean is gaining importance in Nagaland for its multipurpose utilization. However, weeds intense competition with it is one of the major constraints of soybean cultivation. This crop is slow growing and occupies a wider space during its early stage as such, weeds coming up along with the crop intensely competes with the crop that causes considerable reduction in its yield. Tiwari and Khurchania (1990) reported the loss in seed yield of Soyabean to the extent of 26 to 77 percent due to weed competition with it. Thus, it becomes imperative to keep the weeds under check particularly, during initial stages of its growth period. Therefore, the present study was carried out to evaluate the effect of manual weed control, its economic on its growth and yield.

MATERIALS AND METHODS:

Field experiment was conducted on soybean variety, TS-335 in sandy clay loam soil of SARS, Yisemyong during 2010 Kharif season.

The soil of the experimental field was acidic having a pH 5.0, electrical conductivity of 0.2 mmhos/cm , medium organic carbon mineral content (0.74%), low in available phosphorus (10 kg/ ha)and medium in available potassium(160 kg/ha). The total rainfall was 2013.9 mm during the cropping season. Five treatments, viz; T_1= Weedy check, T_2= HW at 20 and 45 DAS, T_3=HW at 30 and 60 DAS, T_4= HW at 20, 40 and 60 DAS and T5= HW at 15, 30 and 45 DAS were taken for this

purpose. All the treatments were tested in a Randomized Block Design with three replications. The crop was uniformly fertilized with 20 kg N, 60 kg P 2O5 and 40 kg K2O/ ha as basal application. Sowing of crop was done on the 21st of June at a spacing of row-row and plant– plant of 30 cm x 15 cm. Total weed population per m^2 was recorded during harvest from randomly selected quadrates of 0.5o xo.50 cm in each net plot. Weeds within the quadrates area were counted and expressed as number of weeds per m^2 .

The dominant weed species was also recorded from the weed check plot. The crop was harvested on the 6th October' 2010 where necessary yield parameters were recorded during harvest. The economic analysis of each treatment was done on the basis of existing market price of inputs used and output obtained under a particular treatment.

DOMINANT WEED FLORA:

The dominant weed flora of the experimental area were Cyperus iria, Digitaria sanguinalis, Cynodon dactylon, Echinochloa colonum (L), Cyperus pylorus, Cyperus diformis, Plantago major (L), Ageratum conyzoides Linn, Erechthites valerianai (Fire weed) Bidens pilosa Linn (Beggars stick), Borreria hispida (L) (Button weed), Cammelena bengalensis (L), Centella asiatica, Euphorbia hista, Oxalis carymbosa Linn and Oxalis corniculata.

Results and discussion:

Table: Effect of weed control on weed density, growth character, yield attributes and grain yield.

Treatments	Weed density No/m2 (at harvest)	Plant height (cm)	No. of branches/ plant	No. of pods/ plant.	Grain wt/ plant(g)	1000 seed wt (g)	Grain yield/ ha. (q)
T_1- Weedy check	158.6	59.9	5.1	23.5	3.9	90	5.5
T_2- HW at 20 & 45 DAS	72.3	67.3	7.5	45	7.7	90.3	10.5
T_3- HW at 30 & 60 DAS	46.3	75.6	5.7	38.3	7.8	90.5	9.8
T_4- HW at 20, 40 & 60 DAS	55	72.2	7.8	43	8.5	90.5	11.1
T_5- HW at 15, 30 & 45 DAS	53.6	86.2	7.2	46.3	9.2	90.6	11.5
C D (P=0.05)	94.18	-	-	12.5	2.6	NS	2.2
S. Em ±	28.8	-	-	3.8	0.8	HS	0.6

Table: Economics analysis of the treatments

Treatments	Yield (q/ha)	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Cost :benefit ratio
T_1- Weedy check	5.5	17100	22000	4900	1:1.28
T_2- HW at 20 & 45 DAS	10.5	26600	42000	16400	1:1.57
T_3- HW at 30 & 60 DAS	9.8	26600	39200	13600	1:1.47
T_4- HW at 20, 40 & 60 DAS	11.1	28600	44400	15800	1:1.55
T_5- HW at 15, 30 & 45 DAS	11.5	28600	46000	17400	1:1.60

* Soybean seeds @ Rs. 40/kg, Urea- Rs. 10/kg, DAP- Rs. 10/kg, MOP- Rs. 10/kg' Labour wages@ Rs. 150/MDW.

EFFECT ON WEEDS:

The number of weeds/m^2 recorded at harvest are presented in the table. Variations in weed density due to hand weeding over control were found significant over the rest of the treatment. The lowest number of weeds/m^2 was recorded when HW was done at 30 and 60 DAS (T_3). However all the hand weeding treatments were at par with each other and highly significant over weedy check.

EFFECT ON PLANT GROWTH:

No significant difference in plant height was recorded in all the treat ments. However, the tallest plant height (86.2 cm) was recorded from T_5 where hand weeding was done at 15, 30 and 45 DAS followed by the other treatments whereas, the shortest plant height (59.9 cm) was recorded from T_1 where no weeding was done.

Hand weeding does not show much significant differences in respect of number of branches/ plant. However, maximum number of branches (7.8) was obtained from T_4. and minimum number of branches (5.1)was obtained from T_1.

EFFECT ON YIELD ATTRIBUTES AND YIELD:

A perusal of the data presented in the table 1 indicated a significant increase in number of pods/plant from the hand weeded treatments over the check plot. Maximum number of pods/plant (46.3) was recorded with treatment T_5 where

hand weeding was done at 15, 30 and 45 DAS. Other treatments T_2, T_3,and T_4 were at par with T_5. The lowest number of pods/plant (23.5) was obtained from check plot T_1. Consequently, hand weeding at 15, 30 and 45 DAS T_5 recorded the highest seed yield (11.5 q/ ha), followed by T_4. Probably, the higher yield from this treatment (T_5) maybe because weeds were effectively controlled from competing for nutrient, space, moisture, etc. at all critical stages of the crop. This finding can be further substantiated by the findings of Ramamoorthy *et al.,* (1995). All the hand weeded treatments T_2, T_3, T_4 and T_5, showed remarkable significant over the check plot T_1 (5.5 q/ha). The low yield from weedy check plot maybe because of non removal of weeds during the critical period of the crop .

ECONOMIC ANALYSIS:

Maximum net return (Rs. 17400/ha) and cost benefit ratio (1:1.60) was registered when hand weeding was done at 15, 30 and 45 DAS in T_5. This was followed by T_4, T_2, T_3 and T_1 respectively. All hand weeded treatments were found to be more significantly better in net return than the check plot. Thus, it can be concluded that hand weeding at 15, 30 and 45 DAS is more effective in controlling weeds and more profitable for cultivation of soy bean.

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CONTROL OF RODENT PESTS OF RICE IN MOKOKCHUNG, NAGALAND.

Temsuinla Jamir

Abstract

An experiment was conducted in the State Agricultural Research Station, Yisemyong, Mokokchung and in farmers' fields of Mokokchung district to evaluate the extent of rodent damage in rice fields and to determine the efficacy of different rodenticides. From the study, it was found that Rattus rattus Linn, commonly called as house rat was more prevalent. The typical nature of rodent damage was the uneven slanting cut of tillers near the base. Maximum damage was recorded at crop maturity stage. The extend of damage as percentage cut tillers was 3.26 %

PURPOSE:

In Nagaland, area under rice cultivation is about 1,40,000 hectares. However, loss due to rodents is a serious concern in rice production. Moreover, even though rice is the staple food, no systematic work has so far been conducted to assess the nature and extent of rodent damage and its subsequent control in the state. Therefore, the present study was undertaken with the following objectives-

1. Collection and identification of rodents associated with rice field.
2. Studies on nature and extent of damage to rice crops.
3. Evaluation of comparative efficacy of different rodenticides against rodents pest in rice crops.

MATERIALS AND METHODS:

The investigation was conducted in the State Agricultural Research Station,

Yisemyong, Mokokchung and in the neighbouring jhum fields.

Adult rodents were collected with traps for species identification.

Bait materials used for trapping was prepared by mixing rice grains with jaggery and mustard oil in 94 :3:3 ratio.

10-15 m trap to trap distance was maintained placing 10 gm of bait in each trap.

Trapped rodents were identified with the help of keys available in literature.

Observations for nature of damage were taken forthnightly from sowing till harvest.

Estimation for extent of damage was assessed according to Flotow's (1979) formula

$$\text{Percent damage} = \frac{a}{a+b} \times 100$$ where,

a= No. of damaged tillers,

b= No. of healthy tillers.

Yield loss was calculated by taking the following observations.

Total No. of tillers in 2 sq. m area=N

No. of damaged tillers =N_1

No. of healthy tillers =$N-N_1$

Yield of grains from healthy tillers (g)= Y

$$\text{Average yield/ tiller (g)} = \frac{N}{N-N_1}$$

$$\text{Potential yield (g)} = \frac{Y \times N}{N-N_1}$$

$$\text{Loss in yield (g)} = \frac{Y*N - Y}{N-N_1}$$

This was then calculated in terms of yield loss in kilograms / ha.

Treatments	Rodenticides used	Concentration (%)
T_1	Bromadiolone	0.002
T_2	Bromadiolone	0.005
T_3	Brodifacoum	0.002
T_4	Brodifacoum	0.005
T_5	Flucoumafen	0.002
T_6	Flucoumafen	0.005
T_7	Zinc Phosphide	2.0
T_8	Control (no treatment)	…..

- Pre-baiting was carried out in case of Zinc Phosphide.
- Poison baits were anticoagulants ie. Bromadiolone, Brodifacoum and Flucoumafen in 0.002 and 0.005 % concentration respectively.
- 10-15 gm of these baits were wrapped in paper and inserted into live burrows.
- Different paddy fields were selected for each concentration of the four rodenticides.
- For each research field, burrows were counted and blocked with mud on the first day of operation.
- No of reopened burrows on the day were considered as live burrows.
- Observations were recorded from the next day of operation upto the 9th day.
- Dead rats were collected, identified and buried.
- All treatments were replicated thrice for confirmation of results.

RESULTS:

- Live rodent trapped were identified as Rattus rattus Linnaeus, Bandicota, Bengalensis Gray and Cannomys Badius Badius Hodgson.

Crop	Av. No. of tillers (healthy & damaged)	No. of healthy tillers	No. of damaged tillers	Av. yield of healthy tillers (g)	Av. yield of damaged tillers (g)	% damaged
Jhum paddy	92	89	3	307	10.35	3 ×100 3+89=3.26

Yield loss per 2sq.m was estimated as (Table):

Total No. of tillers in 2 sq.m	No. of damaged tillers	No. of healthy tillers	Yield of healthy tillers (g)	Av. yield / tiller (g)	Potential yield (g)	Loss in yield / 2 sq.m (g)
92	3	(92-3)= 89	307	307/ 89=3.35	307 ×92/ 89= 317.35	307 ×92/89-307= 10.35

- Typical nature of rodent damage were the uneven slanting cut of tillers near the base.
- Maximum damage was recorded at crop maturity stage and along the periphery of the field.
- Extend of damage as percentage cut tillers was 3.26 % as shown in the table.
- Yield loss per 2sq.m was estimated as (Table):
- In comparative efficacy of different rodenticides, all treatments were highly significant. However, Bromadiolone 0.005 % (T_2) was found most effective recording 100 % mortality on the 7th day followed by Zinc Phosphide 2.0 %.
- The results showed that all the anticoagulants (0.005 %) were highly effective against rodent pest. These findings are in conformity with the earlier reports of Malhi and Prashad (1992), Pandey and Bhadauria (1994) and Bhadauria and Mathur (1995). The results thus obtained can be used in formulating a successful control operations in fields with single dose second generations anticoagulants rodenticides Bromadiolone 0.005 % bait. Control of rodents by Zinc Phosphide as a common practice till date. This product has now been discouraged from use due to severe damage to other non target animals. Another setback reported by Prashad and Kochar (1995) is acute rodenticide enable rats to develop bait shyness.

CONCLUSION:

According to the 3 objectives considered in this study, it can be concluded that,

Rattus rattus Linn, commonly called as house rat, black rat, roof rat or ship rat which live in commensally with man as well as in crop field was found to be more prevalent followed by B. Bengalensis damage was observed more along the periphery of the field due to dense grass cover and forested area.

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EFFECT OF PLANT DENSITY ON GROWTH AND YIELD OF FABA BEAN (*Vicia faba Linn*) UNDER DIFFERENT MOISTURE REGIMES.

T. Supongmar Longchar, L. Nungsang Jamir & N. Tekatushi Ao.

Abstract

An experiment was conducted at State Agricultural Research Station, Yisemyong to evaluate the effect of plant density and moisture regimes in faba bean. The study revealed that there was significant variation due to irrigation which greatly affected the growth and yield attributing parameters. Though variation in planting densities did not significantly affect the growth and yield attributing characters, however, it was recorded that maximum number of nodules/plant and maximum number of grains/plant was obtained when planting distance was kept at 25cmx20cm or 90 plants/sqm. and ultimately highest grain yield (21.5 q/ha.).

INTRODUCTION:

Faba bean (***Vicia faba Linn***) is an important legume crop which is mostly grown during winter season. The productivity of this crop is greatly influenced by its plant density and availability of soil moisture. The high plant density affects the yield of grains, on the other hand, the suboptimal density gives higher grain yield per plant but less yield per unit area. Besides, the moisture condition in the soil also affect the growth and grain yield. Keeping the above facts in view, the present investigation was carried out to determine the optimum plant density and adequate moisture condition for better cultivation and to boost the production.

MATERIALS AND METHODS:

A field experiment was carried out during winter season of 2008 at state agricultural research station, Yisemyong, at an altitude of 1050m Msl The soil of the experimental site was sandy clay loam in texture with PH 4.9 and electrical conductivity 0.2 mmhos/cm, high in organic carbon content (1.00%), medium in available phosphorus (12 kg/ha.) and available potash (156 kg/ha.). Application of NPK @ (20:30:30 kg/ha.) in the form of Urea, DAP and MOP as basal dose were given uniformly to all plots during final land preparation. The treatment consisted of three different planting densities viz:- 20x20cm;

25x20cm and 30x20cm from row to row and plant to plant under irrigated and non-irrigated condition.

The experiment was laid out in the factorial Randomized Block Design with three replications. The seed was sown on 28th Oct. and timely intercultural operation was carried out as whenever necessary. Irrigation was applied at 10 days interval under irrigated condition. Recording of number of nodules per plant was done at 75 DAS and all the biometric recording was done during harvesting time.

Results and discussions:

EFFECT OF IRRIGATION:-

Table No.1: Effect of planting density and moisture regimes on growth and yield attributes of faba bean

Treatments	Plant height (cm)	No. of branches/ plant	No. of nodules/ plant	No. of pods/plant	100-seed wt.(g).
Moisture regime					
Non-irrigated	50.8	2.7	67.4	15.5	25.4
Irrigated	88.9	4.3	74.5	43.5	26.3
CD at 5%	13.09	0.91	NS	10.7	NS
S.EM +	4.15	0.28	-	3.4	-
Planting Distance					
D_1= 20cm x 20cm	66.0	3.8	49.5	32.1	25.5
D_2= 25cm x 20cm	70.5	3.4	74.1	29.1	25.9
D_3= 30cm x 20cm	73.01	3.3	69.3	27.2	26.1
CD at 5%	NS	NS	NS	NS	NS
S. EM ±	-	-	-	-	-
Interaction	-	-	-	-	-

The crop under irrigated condition shows signification results in many aspects over non-irrigated condition. Pertaining to the above given tables reveals that growth and yield attributing parameters viz:- plant height; No. of branches/plant; No. of pods/plant; No. of grains/plant; Wt.

of grains/plant and total grain wt./ plot were superior when the plant were raised under irrigated condition. Maximum gain yield (28.76 q/ha) was recorded from the irrigated over the non-Irrigated condition, crops under irrigated plot received irrigation at ten days interval. The higher grain yield might be due to adequate and frequent irrigation which fulfill the crop needs, create a conducive micro climatic condition which is favorable to plant growth and development. A similar finding was also reported by Salih and Agreb (1983). The increased in seed yield was due to signification increase in no. of branches and no. of pods/plant. No signification results were recorded from no. of nodules/plant and 100-seed wt. However, maximum no. of nodules/plant and 100-seed wt. were obtained from irrigated condition over non- irrigated condition. It was observed that under irrigated condition, profuse vegetative growth and longer duration of crop were noticed than crop under non-irrigated condition.

Table No.2: Effect of planting density and moisture regimes on yield of faba bean.

Treatments	No. of grains/ plant	Total wt. of grains/plant (g)	Grain yield/ plot (kg)	Grain yield (q/ha.)
Moisture regime				
Non- irrigated	35.2	25.0	0.618	12.36
Irrigated	85.1	80.3	1.438	28.76
CD at 5%	16.2	13.4	0.208	4.16
S. Em ±	5.15	4.2	0.066	1.32
Planting Distance				
D_1= 20cm x 20cm	53.4	50.4	0.959	19.19
D_2= 25cm x 20cm	66.4	53.5	1.075	21.50
D_3= 30cm x 20cm	60.8	54.1	1.051	21.02
CD at 5 %	NS	NS	NS	NS
S. Em ±				
Interaction	NS	NS	NS	NS

EFFECT OF PLANTING DISTANCE :

Though the growth and yield attributing characters 0f the plants does not showed signification result by different planting densities, however, it was recorded that out of three different planting densities, maximum number of nodules/plant and maximum number of grain/plant was obtained when planting distance was kept at 25cmx20cm or 90 plants/sq. m, thus ultimately resulted into highest grain yield (21.50 q/ha). This might be due to maintaining adequate plant population/ sq. m for proper utilization of space as well as all the essential nutrients used by the plant. The interaction between moisture regime and planting densities does not significantly effect on the plant growth, yield attributes and grain yield.

Conclusion:-

The study clearly showed that cultivation of faba bean under irrigated condition is found to be very promising than non-irrigated condition, even though this crop is moisture stress tolerant. Also, the most optimum planting geometry is 25cm X 20cm or an optimum plant density of 90 plants per square meter area.

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RESPONSE OF GINGER (*Zingiber officinale*) TO DIFFERENT DATES OF PLANTING AND VARIETIES.

N. Tekatushi Ao, Temsuienla Jamir & T. Supongmar Longchar

Abstract

A field experiment was conducted at State Agricultural Research Station, Yisemyong, Mokokchung district, Nagaland during 2007 to study the response of ginger to different dates of planting and varieties, revealed that planting of ginger in the middle part of April as the best optimum time for planting under mid altitude in rainfed conditions for its higher productivity. No significant yield in respect of varieties.However, maximum yield (209.3 Q/ha) was obtained from Nadia variety.

INTRODUCTION:

Among cash crops, Ginger (***Zingiber officinale Rosc.***) occupies an important place in the agrarian economy of the state. It is widely cultivated by many farmers and a bulk of the ginger produced is exported to other parts of the state in the form of fresh greens. However, its potentiality and productivity per unit area is greatly influenced by proper time of planting and also by planting suitable varieties of ginger. Information on this aspect is meager and very little work is done. Therefore, the present investigation was carried out to determine the optimum date of planting and also to identify suitable varieties for higher productivity of ginger under upland condition.

MATERIALS AND METHODS:

The experiment was conducted at State Agricultural Research Station, Yisemyong, Nagaland in 2007 at an altitude of 1050m MSL. with geographical bearing of 94°36' E Longitude and 26°24' N Latitude. The area is located in humid sub-tropical zone with an average annual rainfall of 1718.9mm. The soil was sandy clay loam in texture with acidic reaction (pH 5.10) and electrical conductivity of 0.2 mmhos/cm, high organic carbon (1.2%), low in available phosphorus (10.5 kg/ha) and medium in available potassium (140 kg/ha).

The experiment was laid out in factorial (RBD) design with three replication. The treatments consisted of three varieties of ginger viz., V1 (Local); V2 (Mongdi) and V3 (Nadia) with four different planting dates viz., D1 (16th April, 2007); D2 (23rd April, 2007); D3 (30th April, 2007) and D4 (6th May, 2007) at 7 days interval. Ginger was planted with the plot size of 2m X 3m (6 sq. m) at the spacing of 30 cm X 45 cm.

Timely intercultural operation was carried out as and whenever necessary and biometric observation was done at 120 and 180 days after planting and during harvesting time.

RESULTS AND DISCUSSIONS:

GROWTH CHARACTERS:

Table: Effect of different dates of planting and varieties on growth and yield of ginger.

Treatments	Plant height (cm)		No. of shoots/plant		No. of leaves/plant		Yield/plot (kg)	Yield (q/ha)
	120 DAP	180 DAP	120 DAP	180 DAP	120 DAP	180 DAP		
Varieties								
V_1	63.91	68.35	7.78	8.60	15.28	16.91	10.23	170.5
V_2	64.65	71.39	6.03	7.72	14.53	18.84	11.56	192.6
V_3	65.00	68.38	6.65	8.11	14.43	16.61	12.56	209.3
C.D at 5%	NS	NS	1.01	NS	NS	1.54	NS	-
S. Em±	-	-	0.34	-	-	0.52	-	-
Date of sowing								
D_1	65.53	70.31	6.31	8.93	12.20	19.08	14.45	240.8
D_2	59.44	68.74	5.75	7.85	14.95	18.78	12.10	201.6
D_3	66.46	65.20	7.35	7.86	15.02	17.17	8.36	139.3
D_4	66.64	73.24	7.86	7.93	16.82	14.77	10.88	181.3
C.D at 5%	4.69	NS	1.16	NS	1.57	1.79	3.74	62.3
S. Em±	1.60	-	0.39	-	0.53	0.61	1.27	21.1
Interaction	NS	NS	NS	NS	NS	NS	-	-

The data pertaining to plant height at 120 and 180 days after planting showed no significant result by different dates of planting and varieties, except significant result was obtained from different dates of planting recorded at 120 days after planting. Maximum plant height was recorded (66.64 cm) at 120 DAP under planting date of 6th May, 2007. Both planting dates and varieties had influence on number of shoots per plant. However, significant result was only obtained at 120 DAP. Maximum number of shoots per plant were recorded from local variety than the other two varieties. Number of leaves per plant recorded at 120 DAP and 180 DAP showed significant influence by different dates of planting and varieties, except on 120 DAP under three varieties. Maximum number of leaves per plant was recorded from V2 (Mongdi) at 180 DAP which is statistically superior to V1 (Local) and V3 (Nadia). Among the different planting dates, maximum number of leaves per plant was recorded from local variety at 180 DAP. Varieties of ginger did not show significant yield. However, maximum yield was obtained from Nadia (209.3 Q/ha) and lowest yield (170.5 q/ ha) from local variety. Different planting dates significantly influenced on yield of ginger. Maximum yield (240 .8 q/ha) was obtained from the planting date of the 16th April followed by planting date of 23rd April which are statistically at par with each other. Lowest yield (139.3 q/ ha) was obtained from planting date of the 30th April.

In all the parameters no interaction effect between different varieties and planting were recorded.

CONCLUSION:

From the above experiment, it can be concluded that among the three varieties, Nadia variety was found to be more suitable than other varieties . Planting of ginger in the middle part of April will be the best optimum time of planting under mid altitude in rainfed conditions for its higher productivity.

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INFLUENCE OF DIFFERENT PHASES OF MOON ON DETERMINATION OF PLANTING DATE FOR POTATO (*Solanum tubersosum* L.)

T. Supongmar Longchar

Abstract

An experiment was conducted at State Agricultural Research Station, Yisemyong, Mokokchung district, Nagaland during 1998 to study the influence of different phases of moon on determination of planting dates for potato. From the study, it was found that sowing on full moon days in both autumn and spring season though did not have significant impact on total tuber yield, however, it significantly affected the marketable tuber yield of potato.

INTRODUCTION:

Potato (***Solanum tubersosum*** L.) is an important cash crop and grown in most parts of Nagaland. It is mainly grown in autumn and spring seasons. Though, its growth and productivity is greatly governed by various environmental factors, date of sowing plays a vital role in achieving higher productivity per unit area. Farmer's traditional belief is that phases of moon have a great influence on the growth and yield of various crop as well as occurrence and non-occurrence of insect pests/ diseases. It is said that seeds sown on certain moon phases are more prone to pest and diseases which results in reduction of marketable tubers or sometimes cause a complete crop loss. Therefore, keeping in view of the above concept, a trial was conducted to ascertain the optimum time of sowing to boost up the productivity of potato.

OBJECTIVES:

1. To study the effect of moon phase on yield of tubers
2. To study pest and disease infestation on the crop/tubers.
3. To study the optimum date of sowing for higher tuber production.

MATERIALS AND METHODS:

A field experiment was conducted at State Agricultural Research Station

(SARS), Yisemyong during the spring season of 1998. The soil of the experimental site was clay sandy loam texture with a soil pH of 5 and Electrical conductivity of 0.2 mmhos/ cm, high organic carbon content (1.00 %). The total available phosphorus and potassium content were 10 and 110 kg per hectare respectively. The experiment was laid out Randomized Block Design with 3 replications. The experiment consist of 5 treatments of Date of sowing viz; T_1 (Dark Moon), T_2 (half moon), T_3 Full Moon, T_4 (7th days after full moon) and T_5 (9th days after full Moon). Individual plots measuring 2.5m × 2.5m was replicated 3 times. Uniform application of NPK @ 40:80:100 kg/ ha was given during land preparation. Half dose of N (40kg/ha) in the form of urea was applied during the first earthing up operation. Kufri Jyoti was sown at a spacing of the 45 × 30 cm. Constant observation and timely recording of the plant performance throughout the growing period was done.

RESULTS AND DISCUSSION:

Table: Influence of moon phases on pest/ disease infestation (%) and tuber yield of potato.

Treatments	% of damage by pests/ diseases	Marketable tuber yield (Q/ha)	Unmarket-able tuber yield (Q/ha)	Total tuber yield (Q/ha)
T_1 (Dark Moon)	24.9	149.6	49.6	199.2
T_2 (Half Moon)	15	168.64	29.76	198.4
T_3 (Full Moon)	9.9	190.56	21.15	211.7
T_4 (7 days after full moon)	15	173.94	30.72	204.6
T_5 (9 days after full moon)	20	154.45	38.64	193.0
CD (P=0.05)	-	22.88	14.24	NS
S. Em ±	-	7.36	4.64	-

TUBER YIELD :

The data presented in the table revealed that there was no significant differences in the total tuber yield. However, there was a significant difference in marketable tuber yield as well as unmarketable tuber yield. The highest marketable tubers (190.56 q/ha) was obtained from the

crop sown during the full moon, followed by potato tubers sown on 7th days after full moon (173.94 q/ha) and half moon day (168.68 q/ha) respectively. The lowest marketable yield (149.6 q/ha) was recorded when the potato sown on dark moon day.

PEST AND DISEASES INFESTSTION (%)

Pest and diseases infestation(%) of potato tubers was lowest (9.9%) when the tubers was sown at full moon day and highest infestation (24.9%) was recorded from dark moon day sowing. The maximum tuber yield obtained from full moon sowing was mainly due to minimum damaged caused by pests and diseases infestation.

CONCLUSION:

Basing on the present investigation, it can be concluded that potato tuber should be sown on full moon days in both autumn and spring season for obtaining maximum possible tuber yield as well as to prevent incidence of pests and disease problems.

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EFFICACY OF DIFFERENT MULCHING MATERIALS ON THE GROWTH AND YIELD OF BROCCOLI *(Brassica Oleracea var.etalica)*

T. Supongmar Longchar & L. Nungsang Jamir.

Abstract

A field experiment was conducted during Rabi season of 2009 at SARS, Yisemyong to evaluate the effect of different mulching materials on growth and yield of broccoli. The result revealed that maximum yield of broccoli (170 q/ha) was obtained by black polythene mulching; a comparable yield (152 q/ha) was also recorded when paddy straw was used as mulching material. The two treatments gave significantly higher yield than other treatments. The lowest yield (120 q/ha) was recorded from the treatment where no mulching material was used.

INTRODUCTION:

Broccoli is an important and promising vegetable crop which was introduced in Nagaland state a few year ago . The crop is becoming popular due to its delicacy and also because of its good nutritive value. At present, this crop covers only a negligible area however, its market demand is high. Its productivity and production potential is greatly influenced by various agronomical practices. Mulching is one of the important agronomic practices in various vegetable crops. However, no such trial was conducted earlier on this crop in Nagaland condition. Therefore, the present investigation was carried out to evaluate the effect of different mulching materials for broccoli production.

MATERIALS AND METHODS:

A field experiment was conducted during Rabi season of 2009 at SARS, Yisemyong. The experiment consisted of 6 different mulching materials that was viz; Control (T_1), White polythene (T_2) , Thatch grass (T_3), Paddy straw (T_4), Black polythene (T5) and Jute bag (T_6). The soil of the experimental site was sandy loam, medium in organic carbon content (0.74 %), low in available phosphorus (4.00 kg/ha) and medium in available potassium (250 kg/ha) with soil pH (4.8) acidic in reaction and electrical conductivity of 0.3 (mmhos/cm). The experiment

was conducted in Randomize Block Design with 3 replications. One month old seedlings of broccoli var. Pushpa was transplanted on the 22nd October' 2009. recommended doses of fertilizers @ 60:100:100 NPK (kg/ha) and 20 MT FYM was applied.

Result and discussions:

Table-1: Effect of different mulching materials on growth, and yield of broccoli.

Treatments	Plant height (cm)	No. of leaves/ plant	Diameter of head (cm)	Head Wt (kg)	Yield (kg/plot)	Yield (Q/ha)
T_1 – No mulching	34.9	13.8	15.5	0.34	8.1	120
T_2 – White polythene film	32.7	13.5	18.5	0.40	9.2	136
T_3 – Thatch grass	36.6	13.4	21.7	0.44	9.3	137
T_4 – Paddy straw	35.2	14.5	21.8	0.52	10.3	152
T_5 – Black polythene film	36.7	14.4	22.0	0.56	11.5	170
T_6 – Jute bag	35	13.6	21.1	0.47	10.2	151
S.EM ±	_	-	-	-	0.5	7
CD (P=0.05)	NS	NS	NS	NS	1.6	24

Effect on growth:

Various mulching materials did not show any significant effect on plant height and number of leaves per plant. However it was observed that maximum plant height (36.7 cm) was recorded when black plolythene was used as mulching material which was closely followed by thatch grass and paddy straw.

EFFECT ON YIELD ATTRIBUTES:

Maximum diameter of broccoli head (22.0 cm) and head weight (0.56 kg/plant) was recorded from the treatment where black polythene was used (T_5) followed by paddy straw (T_4). The lowest values of diameter of head (15.5 cm) and head weight (0.34 kg/head) was obtained from control (T_1).

YIELD:

There was significant effect in yield of broccoli due to various mulching materials. Maximum yield of broccoli (170 q/ ha) was recorded under black

polythene film. The higher broccoli yield obtained under this treatment might be due to conducive micro-climatic condition provided by black polythene film which also effectively checked weeds growth. Comparable broccoli yields were also obtained under mulching material such as paddy straw and jute bag treatments. These treatments were statistically at par with each other and significantly higher than the rest of the treatments. The lowest yield (120 q/ha) was recorded from the treatment where no mulching was used.

Conclusion:

The findings from this study revealed that for better and higher yield of broccoli can be achieved by using different mulching material than non mulching.

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INFLUENCE OF NPK FERTILIZERS AND PLANTING GEOMETRY ON GROWTH AND YIELD OF TORIA-36 (*Brassica Compestris*)

T.Supongmar Longchar & L. Maongsang Longkumer

Abstract

A field experiment was conducted during rabi season of 2010 to study the response of Toria (Brassica compestris) to NPK fertilizers application and different planting geometry. Application of NPK @ 60:50:20(kg/ha) recorded significantly higher seed yield (15.57q/ha). Seed yield was not significantly influenced by planting geometry, however, planting geometry of 30 cm × 10 cm recorded higher seed yield than other treatments.

INTRODUCTION:

Toria (***Brassica compestris***) is one of the major oilseed crop grown during Rabi season in Nagaland. The present requirement of edible oil in the state is meet through import from outside the state due to its low production. Moreover, the area under this crop is negligible. The low production and poor productivity of toria in our state is mainly due to lack of nutrient management and proper maintenance of plant population per unit area. Most of the farmers cultivate toria as a secondary crop after harvesting of paddy in their field without maintaining soil nutrients and other agronomic practices. Owing to these reasons, yield of toria is greatly affected. Therefore, the present investigation was carried out to determine the influence of NPK fertilizers and optimum planting geometry for higher production and productivity of toria cultivation.

MATERIALS AND METHODS:

A field experiment was conducted during rabi season 2009 at State Agricultural Research Station, Yisemyong at an altitude of 1050m MSL.The soil of experimental site was sandy clay loam soil in texture with acidic in reaction (PH4.9) ,medium in organic carbon content(0.72%),low in available phosphorus (10 kg/ha) and medium in available potash(140 kg/ha).The experiment was laid out in Randomized Block Design comprising

all possible combinations of 4 level of NPK fertilizers Viz : F_0-No fertilizer (Cotrol); F_1=50:40:10, kg/ha; F_2=60:50:20 NPK(kg/ha); F_3 = 70:60:30 NPK (kg/ha) and 3 planting geometry Viz:- S_1=30cm x 5cm ;S_2=30cm x 10cm ;S_3= 30cm x 15cm each replicated 3 times. Full doses of P, K and half dose of N in the form of Rock Phosphate, MOP and Urea were applied as basal doses. Toria seeds was sown on 28th Oct, 2009 and remaining half dose of nitrogen was applied at 30 days after sowing.

RESULT AND DISCUSSIONS:

EFFECT ON GROWTH:

TABLE.No.1: Effect of NPK fertilizers and planting geometry on growth and yield of toria.

Treatments	Plant height(cm)	Number of Siliquae/ plant	Seed yield(g)/ plant	Seed yield(kg/ plot)	Seed Yield(q/ha)
Fertilizers:					
F_0=0:0:0, NPK (Kg/ha)	74.8	109.3	5.27	0.202	5.05
F_1=50:40:10, NPK(Kg/ha)	88.5	183.3	7.97	0.511	12.77
F_2=60:50:20 NPK(Kg/ha)	91.5	188.7	9.91	0.623	15.57
F_3=70:60:30 NPK(Kg/ha)	84.9	171.9	7.86	0.563	14.07
S. Em±	3.0	2.6	0.61	0.029	0.72
CD at 5 %	9.0	5.2	1.75	0.085	2.12
Spacing:					
S_1=30cmx5cm	80.6	133.9	6.10	0.463	11.57
S_2=30cmx10cm	85.7	177.3	8.96	0.493	12.32
S_3=30cmx15cm	88.3	178.7	8.20	0.468	11.70
S. Em±	NS	5.0	0.53	NS	NS
CD at 5 %	-	10.1	1.55	-	-
Interaction F x S	Sig	Sig	Sig	Sig	Sig

Application of NPK fertilizers showed significant increase in plant height as compared to non fertilized treatment. The highest plant height(91.5cm) was recorded from the fertilizer applied treatment of (F_2) followed by treatments (F_1) and (F_3) which were at par with each other but significantly taller than control (F_0). Plant geometry could not produce any significant differences in respect of plant height. However maximum plant height (88.3cm) was recorded from the planting spacing of 30cm x15 cm (S_3).

YIELD ATTRIBUTES:

The number of siliquae/plant was significantly increased by application of NPK fertilizers and variation in planting geometry. Maximum number of siliquae/plant (188.7) was recorded in F2 when NPK fertilizers was applied @ 60:50:20 kg/ha which was significantly higher than other treatments. Planting geometry of 30cm x 15 cm gave maximum siliquae/plant (178.7) which was at par with the planting geometry of 30cm x10 cm but significantly superior to 30 cm x5 cm.

SEED YIELD:

There was significant difference in seed yield of toria due to NPK fertilizers application. The maximum grain yield(15.57 q/ha) was recorded from the fertilizers treatment of 60:50:20 NPK (kg/ha) followed by fertilizer treatment of 70:60:30 NPK (kg/ha). These two treatments were significantly higher than non fertilized treatment. The higher grain yield obtained from Treatment (F_2) could be attributed to its beneficial influence on yield attributes and also might be due to the crop receiving adequate supply of major nutrients during active growing period. Data analysis shows that seed yield of toria was not significantly influenced by planting geometry. However, maximum seed yield (12.32q/ ha) was obtained from planting geometry of 30 cm x 10 cm.

INTERACTION EFFECT:

The interaction effect of data of fertilizers application and planting geometry on seed yield/plant was found significant (table.2.). The highest seed yield/plant (11.4g) was obtained from the fertilizer treatment of 60:50:20 NPK (kg/ha) with the planting geometry of 30 cm x 10 cm

Table.No.2. Interaction effect between fertilizers and planting geometry on Seed yield (g)/plant.

Treatments	Fertilizers				Mean
	F0	F1	F2	F3	
S1=30 cm x 5 cm	4.4	6.1	7.7	6.1	6.0
S2=30 cm x 10 cm	5.7	10.3	11.4	8.4	8.9
S3=30 cm x 15 cm	5.6	7.4	10.6	9.0	8.1
Mean	5.3	7.9	9.9	7.8	-
S. Em±	1.06				
CD at 5 %	3.10				

which was at par with similar fertilizer treat ment with the planting geometry of 30 cm x15 cm but significantly superior to all other treatments.

CONCLUSION:

It can be concluded that for achieving higher seed yield, fertilizer application of 60:50:20 NPK (kg/ha) and planting geometry of 30 cm x 10 cm is optimum for cultivation of toria under mid altitude condition of Nagaland state.

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Effects of some fungicides in the management of Cercospora disease of Groundnut

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Abstract

A field study was carried out at the State Agricultural Research Station, Yisemyong, Mokokchung to evaluate the effectiveness of three fungicides for management of Cercospora leaf spot disease on Arachis hypogaea L. *Three spray applications of different doses of Carbendazim (Bavistin), Mancozeb (Dithane M-45), and Metalyxl (Ridomil) were applied as foliar spray at 15 days interval beginning 25 days after emergence (DAE). Carbendazim applied at 0.1 % recorded the lowest disease incidence with 40.0 % at 95 DAE and highest seed yield with 2302 kg/ha and haulm yield with 4778 ka/ha respectively.*

Keywords: *Groundnut; Cercospora leaf spots;Fungicides; Yield*

Introduction:

Groundnut (***Arachis hypogaea* L.**), is an important legume crop cultivated in some 90 countries around the world (Virmani and Singh 1985). In Nagaland, it is grown in an area of 730 hectares with a total production of 740 MT. The crop however, is affected with early leaf spot disease caused by the fungus Cercospora arachidicola S. Hori (teleomorph Mycosphaerella arachidis Deighton) and poses perpetual problem to its production and cultivation in the state. The disease is reported to cause severe damage to groundnut crop in different parts of the world with worldwide losses as high as 50% of the seed yield and even higher for haulms (Mc Donald et al.,1985, Salako, 1987; Nyval, 1989). Although these losses may be reduced by the use of diseases resistant cultivars, crop rotations or sanitation practices such as removal of volunteer plants, and burial of groundnut residues, fun gicides are still essential to achieve optimal yields during most years (Bailey et al., 1994). It is with this rea son therefore, the efficacy of three fungicides at different spray doses was studied in managing Cercospora leaf spot disease of

groundnut.

Materials and Methods:

The study was conducted at the State Agricultural Research Station (SARS), Department of Agriculture, Yisemyong, Mokokchung, during 1999 and 2000 cropping seasons. The experiments was laid out in a randomized complete block design (RCBD) and replicated three times. Each plot measured 3 x 3 m with plant to plant and row to row spacing of 50 x 30 cm respectively. Seeds obtained from the SARS store were sown during the month of June in both the years. Two seeds each were sown per hole at the depth of 5 cm. A fertilizer dose of 30 kg N/ha, 40 kg P2O5/ha and 40 kg K2O/ha was applied at the time of planting. The experimental area had been continuously cropped with groundnut for the past 3 years resulting in build up of disease inocula and so natural epiphytotics in the field were relied upon as the source of inocula in all the seasons. Hand weeding was done at 20 days after sowing (DAS) and 40 DAS respectively. Three spray applications of different doses of Carbendazim (Bavistin), Mancozeb (Dithane M-45) and Metalyxl (Ridomil) were applied at 15 days interval as foliar spray at 28 days after emergence (DAE), 43 DAE and 58 DAE. There were altogether seven treatments including control with the following arrangement :T_1: Carbendazim @ 0.05 %, T_2: Carbendazim @ Carbendazim @ 0.05 %,T_2: Carbendazim @ 0.1 %, T3: Mancozeb @ 0.05 %, T_4: Mancozeb @ 0.1 %, T_5: Metalyxl @ 0.05 %, T6: Metalyxl @ 0.1 %, and T_7: Control. Spraying was done using a hand operated knapsack sprayer according to the treatments.

The incidence of Cercospora leaf spot was recorded starting from a week after the third spray at an interval of 15 days i.e., 65 DAE, 80 DAE and 95 DAE respectively. The number of plant stand showing symptoms of the diseases in each plot was counted and the percentage of disease incidence was computed. The disease incidence (DI) was assessed by using the following formula:

$$DI = \frac{\text{Number of infected plants per plot}}{\text{Total number of plants per plot}} \times 100$$

Seed yield was recorded by weighing dried seeds from each plot and expressed in kg/ha. The haulm yield was recorded by weighing the dried haulms from each plot and

expressed in kg/ha.

Treatment	% disease incidence		
	65 DAE	80 DAE	95 DAE
Carbendazim @ 0.05 %	23. 2	33.5	45.1
Carbendazim @ 0.1 %	21.1	29.3	40.0
Mancozeb @ 0.05 %	26.3	40.6	49.7
Mancozeb @ 0.1 %	23.3	32.3	44.3
Metalyxl @ 0.05 %	30.5	48.9	57.4
Metalyxl @ 0.1 %	29.2	44.2	47.2
Control	74.1	86.3	97.2

* Data are average means of three replications

Table 2: Effect of different fungicides a doses on seed and haulm yield of groundnut

Treatment	% disease incidence	
	Seed Yield (kg/ha)	Haulm yield (kg/ha)
Carbendazim @ 0.05 %	1980	1980
Carbendazim @ 0.1 %	2302	2302
Mancozeb @ 0.05 %	1950	1950
Mancozeb @ 0.1 %	1990	1990
Metalyxl @ 0.05 %	1805	1805
Metalyxl @ 0.1 %	1988	1988
Control	970	970

In all the treatments, the three fungicides significantly reduced the incidence of disease compared to control (Table 1). However, treatment with Carbendazim @ 0.1 % consistently contributed to the lowest incidence of the disease (21.1, 29.3, 40.0) in all the three evaluation dates followed by Mancozeb @ 0.1 % (23.3, 32.3, 44.3), whereas Control treatment recorded the highest disease incidence with 74.1, 86.3 and 97.2 respectively. The effects of fungicides on yield in the study also showed that their application at different doses gave higher seed and haulm yield compared to control (Table 2). Application of Carbendazim @ 0.1 % obtained the highest yield with 2302 seed Yield

(kg/ha) and 4778 haulm yield (kg/ha) followed by Man cozeb @ 0.1 % with 1990 seed Yield (kg/ha) and 4326 haulm yield (kg/ha) respectively.

The results obtained in the present investigation concord with the reports of Macdonald (1970), Porter (1970),Sindhan & Jaglar (1988) and Twumasi (1993) who reported on the efficacy of ancozeb, Benomyl and Carben dazim fungicides for controlling Cer cospora leaf spot disease of ground nut and also increasing the yield. Similar reports on the efficacy of fungicides on Cercospora leaf spot of groundnut have been made by several authors (Salako, 1985; Mc Donald et al.1985, Chandra et al, 1998). The superiority of Carbendazim over Mancozeb in the present study also corroborates with Jadeja et al, (1999). Carbendazim is known to enhance plant disease resis tance through increase in total phenol and potassium while decreasing sug ars, nitrogen and phosphorus contents of treated plants and thus facilitating reduction and control of Cercospora leaf spot of groundnut (Sindhan & Jaglar, 1988). Phenomenon akin to their observation may have also occurred in the present study. It can be concluded from this study that for ef fective management of Cercospora leaf spot disease and to achieve optimal yields of groundnut, spraying of Carbendazim @ 0.1 % at 28 DAE, 43 DAE and 58 DAE is essential.

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TO DETERMINE THE OPTIMUM PLANTING DISTANCE OF AOCHISANG PTEROCOCUS CORNICULATUS (*FAM: EUPHORBIACEAF*)

S. SOSANG JAMIR & LANUNOCHETLA

Abstract

Pterococus corniculatus locally known as Aochisang was ones a wild perennial plant, but recently it has been domesticated and cultivated by farmers in parts of Nagaland. Since no scientific research has been done so far on this plant, the experiment was conducted to determine the optimum planting distance i.e T_1=45cmx45cm, T_2= 60cmx60cm, T_3=75cmx75cm and T_4= 90cmx90cm as treatments. It was observed that more number of shoots were plucked from the plants with the smaller spacing T_1 (45cmx45cm) which decreased gradually with increase in planting space. But the total weight of shoots was found to be more in T_4 (90cmx90cm) which decreased gradually with decrease in planting space. It may be concluded that healthier but less number of shoots were produce from plants with larger spacing but more number of climbers were plucked from plants with smaller to plant spacing.

INTRODUCTION:

Pterococus is a perennial climber grown widely in jhum field and in abandoned fields. The plant is grown in many parts of Nagaland and the tender leaves and shoots are consumed as vegetable. The propagation is done mostly through seeds and less frequently through cuttings.

In recent years it has become an important commercial leafy vegetable crop in Nagaland. Owing to its high demand for consumption purpose, it has high market value and is ranked among the topmost of all leafy vegetables. To meet the market demands few farmers have started domesticating the wild plant into a more commercialized food item and expanding its cultivated area. With this view, the experiment was conducted to determine the optimum planting distance of Aochisang. The main objective of the experiment was to study the optimum plant to

plant spacing with economically better return and which in turn benefits the farmer.

Materials and method:-

The experiment was conducted at SARS yisemyong which is located at 1050m above MSL in the year 2007. The soil of the experimental site was sandy clay loam and acidic in nature. The experiment was laid out in RBD with 4 treatments and replicated thrice. The treatments were T_1 = 45 cm x 45 cm, T_2= 60 cm x 60 cm, T_3 = 75 cm x 75 cm and T_4 = 90 cm x 90 cm . sowing in nursery was done during 1st week of April 2007 and transplanting into the main field was done during last week of May 2007. When the plant height reached 30cm from the ground level, the tip was pinched off so as to encourage a bushy canopy. All agronomic practices were carried out whenever required.

Results and discussions:-

Table I: Effect of planting distance on green yield of Aochisang, *Pteroccocus corniculatus*

Treatments **Planting distance**	Climbers per plant	Weight of climbers	Climbers per plot	Weight of climbers per plot (kg)	Green yield (kg/ha)
T_1=45cmx45cm	51.2	0.20	279.0	0.80	1066.64
T_2= 60cmx60cm	48.7	0.27	258.2	1.18	1573.3
T_3=75cmx75cm	43.5	0.29	191.7	1.22	1626.6
T_4= 90cmx90cm	35.7	0.32	135.5	1.68	2264.2
CD at 5%	NS	NS	47.801	0.239	318.6
S.SE±	-	-	14.942	0.074	98.6

From table 1, it was observed that T_1 (ie. 45cmx45cm) produce more number of climbers with a mean of 512 which was the highest followed by T_2 (60cmx60cm), T_3 (75cm x75 cm) and T_4 (90cmx90cm) with a mean of 48.7, 43.5 and 35.7 respectively. Although the number of climbers plucked per plant was more in T_1. however, the weight of climbers per plant was more in T_4. It may be due to healthier shoots produced from plants with more plant to plant spacing. The climbers plucked per plant and weight of climbers per plant does not show any significant results. Similar observations were recorded climbers plucked per plot from table

1, T_1 and T_2 (279.0 and 258.2) were at par to each other but T_4 (135.5) showed significantly the lowest count. From the observations recorded from total weight of climbers per plot, the highest yield was obtained from T_4 with a mean of 1.68 followed by T_3 (1.22), T_2 (1.18) and T_1 (0.80). The treatments T_2 and T_3 were almost at par to each other but T_4 showed a significantly higher yield.

This indicates that no. Of climbers plucked increased with decrease in plant to plant spacing and vise versa. But the total weight of climbers in creased with increase in plant to plant spacing and vise versa.

Conclusion:-

It may be concluded that the plant with a larger spacing of 90cmx90cm should be practiced as it gives healthier shoot which has more marked value. The production of Aochisang was 2264.2kg/ha.

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Efficacy of different level of NPK on growth and yield potentiality of SARS-5 (Manen tsÜk) upland paddy.

T. Supongmar Longchar & Toshimenla

Abstract

Field study was conducted during the Kharif 2010 at State Agricultural Research Station (SARS) Yisemyong, Nagaland with an objective to estimate the appropriate nutrient requirements of the Manen tsÜk (SARS-5) in order to get the maximum paddy yield. Effect of six levels of NPK namely; T_1=0:0:0 (control), T_2=30:20:10, T_3=40:30:20, T_4=50:40:30, T_5=60:50:40, T_6=70:60:50 (kg/ha) on yield components were studied. Plant height, panicle length, 1000grain weight and yield showed the maximum responds at 60:50:40 (NPK)kg/ha.

Introduction:

Nagaland is considered as one of the most rice biodiversity rich region. Varieties of rice germplasm are found present in the region which may be due to the availability of different ecosystem for rice cultivation coupled with the preference of farmers belonging to distinct ethnic groups. Certain upland rice varieties have desirable characteristic, particularly in terms of their fragrance, colours, sizes, shapes and protein contents. Manen tsük (SARS-5) is one such upland paddy of Nagaland, with high protein content of 14.66% coupled with high yielding. This cultivar is most suitable for growing in the 2nd year Jhum field.

Traditional shifting cultivation systems practiced by indigenous farmers are generally believed to be well adapted to the climate and ecologically sound. However, due to intensified systems of farming, with an extended cropping period and a shortened fallow period, the land are highly degradated, such as nutrient depletion and erosion. The low grain yields of upland rice is attributed to the poor management by the farmers during the cultivation period, where fields are left unattended after sowing without any monitoring on plant nutrients andother critical aspects, such as weeds, diseases, and insects pests management, the grain yields of upland rice varieties are expected

to increase. Therefore, the present study was made with an objective to estimate the nutrient requirements of the Manen tsük to get the maximum paddy yield.

Materials and methods:

The experiment was conducted at the field experimentation site of State Ag-ricultural Research Station, Yisemyong,Nagaland during the Kharif season (2010). This site is located 26° 40° 28'' E longtitude at an altitude of 1050m MSL, with an annual rainfall of about 1,100-1,400mm. * the soil of experimental site was sandy clay loam in texture, with soil PH (5.1) acidic in reaction, electrical conductivity 0.3mmha/cm, organic carbon (0.74%), Low in available, P (5.0kg/ha) and medium in available K (125kg/ha).

* The trial was set up in a RBD with three replications. The plot size was 2.5cmx2.5cm (6.25 sq/m) and the seeds were planted maintaining a spacing of 20x10cm. Urea, Di-Ammonium phosphate (DAP) and potash (MOP) were used as nitrogen, phosphorus and potassium sources respectively. Six levels of NPK namely; T_1=0:0:0 (control), T_2=30:20:10, T_3=40:30:20, T_4=50:40:30, T_5=60:50:40, T_6=70:60:50 NPK (kg/ha) Compr-ising of six treatments were used. Phosphorus and potash were applied as based dose where as nitrogen was applied in three equal splits viz; at sowing, tillering and panicle initiation. Other agronomic and plant protection practices were followed in order to raise a healthy plant growth. Observations were made from five randomly selected plants and data were taken on plant height, number of effective tillers, panicle length, number of filled grains, grain weight/ panicle, 1000 grain weight and yield/ ha during the maturity and at harvest.

Results and discussion:

The results of mean data (table 2) showed that plant height at 60 DAS, plant height at harvest, panicle length, 1000 grain weight and yield of the plant were signify-cantly influenced by different level of NPK. Yosef tabar (2012) also re-ported significant influenced of nitrogen and phosphorus fertilizer on the tiller number, 1000 grain weight and yield of the rice plant.

Table 2: Plant height, number of effective tillers, panicle length, number of filled grains, grain weight/panicle, 1000 grain weight and yield of Manen tsuk as influenced by different level of NPK.

Treat-ment	Plant height (cm) at 60 DAS	Plant height (cm) at harvest	No. Of effective tillers	Panicle length (cm)	No. Of filled grains	Grain Weight/ panicle (g)	1000 grain weight (g)	Yield (Q/ha)
T_1	98.10	141.63	3.6	25.2	175.2	1.9	6.5	22
T_2	120.88	164.76	4.4	27.3	198.0	2.2	6.6	34
T_3	125.66	169.96	5.3	29.1	206.2	2.5	6.8	40
T_4	130.66	167.43	4.7	28.8	217.1	2.2	6.9	43
T_5	134.88	170.00	4.5	31.0	225.0	2.6	7.2	44
T_6	131.77	166.33	3.6	27.9	199.7	2.2	6.6	41
CD at 5%	16.56	13.9	NS	NS	NS	NS	0.05	5.7
S.SE±	5.25	4.4	NS	NS	NS	NS	0.01	1.0

Plant height:

Maximum plant height for both 60 DAS and at harvest was recorded in treatment where NPK of 60:50:40 kg/ ha was applied. However, minimum plant height of 98.10cm was achieved in control treatment where no fertilizer was applied. Manzoor *et al.*, (2006) suggested that the increase in plant height with increase N application might be primarily due to enhanced vegetative growth with more nitrogen supply to plant. Phosphorus is important for plant growth and promotes root development, tillering early flowering and performs other functions like metabolic activities, particularly in synthesis of protein (Panhawar *et al.*, 2011) was achieved in control treatment where no fertileizer was applied. Manzoor *et al.*, (2006) suggested that the increase in plant height with increase N application might activate, particularly in synthesis of protein (*Panhawar et al.*, 2011).

Panicle length:

This cultivar produces the longest panicle length (31cm) where

the NPK dose of 60:50:40 kg/ha was applied. The shortest panicle length (25.2cm) were recorded in control treatment receiving no fertilizer. This result is in line with those reported by Munda et al, (1989) and manzoor *et al.*, (2006). The longer panicles obtained in treatments receiving higher NPK rate may be apparently due to availability of better or more nutrient status of plant during panicle growth period.

1000 grain weight:

1000 grain weight (7.2gm) was also highest in treatment receiving NPK rate of 60:50:40 kg/ha. Zero level of NPK, ie, control obtained the minimum (6.5 g) grain weight. This result is in accordance with those reported by Manzoor *et al.*, (2006) and Rafey *et al.*, (1989). Manzoor et al., (2006) suggested that increase in grain weight at higher rate of N might be primarily due to increase in chlorophyll content of leaves which led to higher photosynthetic rate and ultimately plenty of photosynthetic available during grain development.

Yield:

The treatment of NPK 60:50:40 kg/ha produced the maximum grain yield of 44 q/ha. The lowest paddy yield (22q/ha) was recorded in control treatment where no fertilizer was applied. The findings are also in accordance with that of Azad et al, (1995), Hag *et al.*, (2002) and Manzoor *et al.*, (2006) who reported increase in grain yield of rice as the rate of NPK increased

Conclusion:

The findings from this study revealed that the cultivar Manen tsük (SARS-5) responded differently to the application of different rates of NPK fertilizers. The study indicated that the appropriate nutrient requirements of the Manen tsük will be NPK rate of 60:50:40 kg/ha to get the maximum paddy yield.

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EFFECT OF PLANT POPULATION ON FRUIT PARAMETERS AND YIELD IN GREEN CHILLIES

Maongsangla

Abstract

An experiment with three cultivars and six levels of spacing was laid on RBD.Significant differences among varieties and spacing treatments were observed. PusaJwala recorded the highest yield by virtue of the highest fruit number. Longsa variety (Local) had the longest fruits length, best fruit width and fruit weight.

The spacing treatments had significant influences. Almost all the parameters like average fruit width, fruit weight and average number of fruits were significantly superior in the widest spaced (T_6) plants, but recorded the least per hectare yield. Though, these parameters were poor at the closest spaced plants, yield per hectare was maximum indicating the role of number of plants per hectare. The interaction effects were non – significant except for the number of fruits, average fruit weight and yield per plant.

Introduction:

Chilli (***Capsicum annuum***) is valued for its diverse commercial uses. Chilli has a wide range of adaptability to cultivation, being grown under both the tropical and sub-tropical conditions, under a variety of soils. The crop demands good nutrition and responds well to fertilization. Many varieties are available in India and are region specific varying in plant habit, yield and quality parameters (Mishra & Singh, 1974). The increased yields in chillies can also be achieved by use of improved varieties along with improved cultivation practices such as appropriate spacing. The investigations carried out on effects of spacing in chillies by Rajgopal, *et al* ., (1977) and Choulgule and Mahajan (1979) clearly indicated that closer spacing recorded higher yields.

Identification of a better variety, proper spacing which results in better fruit and yield parameters and the best combinations of them may help in boosting up of the productivity of green chilli (Revanappa *et al*., 1997).

Hence this present study was initiated to find out how the yield is affected through different parameters and crop spacing.

Materials and Methods:

A RBD field experiment was laid out to identify better variety and optimum spacing for higher yields. Three varieties were used: Pusa Jwala (R_1), Longsa chilli (Local) (R_2) and Lothachilli (Local) (R_3) as replications. The investigation was carried out at SARS, Yisemyong from the month of March 2007 to September 2007.

The seeds were sown on 12th March 2007. Six weeks old chilli seedlings were transplanted in a plot size of 3X2 meter as per the spacing treatments (T_1=60 X 30cm; T_2=60 X 45cm; T_3=60 X 60cm; T_4=75 X 30cm; T_5=75 X 45cm; T_6=75 X 60cm) in three replications. The recommended fertilizer dose of 120:60:60 NPK Kg/ha was applied along with FYM @ 2T/ha. Half N, full P and K was applied before transplanting and remaining N was applied after one month as top dressing. Fruit length was measured from the point where the fruit is attached to the pedicel upto its tip. Fruit width was measured at its widest point by Vernier calipers. Totally six pickings of green chilli were made and all were added up to calculate the yield per hectare. Similarly, number of fruits in each pickings were summed up to obtain the total number offruits per plant.

Results and Discussions:

Table 1: Yield per plant (gms), yield

Treatments	**Yield per plant (gms)**				**Yield per hectare (Qtls)**			
	Pusa Jwala (R_1)	Longsa (R_2)	Lotha (R_3)	Mean	Pusa Jwala (R_1)	Longsa (R_2)	Lotha (R_3)	Mean
60x30cm (T_1)	186.65	147.84	142.76	**159.08**	74.66	59.13	57.10	**63.63**
60x45cm (T_2)	287.62	225.38	224.65	**245.89**	76.69	60.10	59.90	**65.56**
60x60cm (T_3)	348.86	235.18	232.58	**272.20**	69.77	47.03	46.51	**54.44**
70x30cm (T_4)	223.47	167.26	166.55	**185.76**	67.04	50.17	49.96	**55.72**
70x45cm (T_5)	335.26	210.53	225.50	**257.09**	67.05	42.62	45.09	**51.59**
70x60cm (T_6)	350.19	236.27	237.43	**274.63**	52.52	35.44	35.61	**41.19**
Mean	**288.68**	**203.74**	**204.91**		**67.95**	**49.08**	**49.03**	
CD at 5%	**36.81**				**11.12**			

Significant at 1 & 5 probability level.

per hectare (Q) as influenced by varieties and level of spacin Significant varietal differences were observed with respect to yield/plant and yield/ha (Table 1) affecting fruit parameters (Table 2). PusaJwala (R1) recorded maximum yield at 67.96 Q/ha. However, there was no significant differences between Longsa (R2) and Lotha (R3) varieties. Higher number of fruits must be the reason for Jwala's highest yield. It has produced an average of 57.39 numbers of fruits per plant. Inspite of having lengthy, heavier and wider fruits, other varieties were unable to surpass the yield of Jwala indicating the major role of number of fruits in deciding the yield. Similar variations regarding fruit parameters among varieties were ported by Usha Rani, (1981). Though, the genetic constitution may be responsible for For these variations, they are also known to be influenced by managemental practices. The spacing treatments were found significantly in determining the yield (Table 1). The spacing 75X60 cm recorded the highest yield of 274.63 gms per plant. The early findings by Revanappa et al., (1997) and Shabnan et al., (2002) are in agreement with the results of the present investigations. For the higher per plant yield, The weight of the fruit was determined by fruit parameters like length and width which was also better in magnitude in widely spaced plants of 75X60cm spacing. The higher fruits per plant in widely spaced plants is attributed to higher availability of nutrients,

Table 2: Number of fruits, average fruit weight, average fruit length, average fruit width as influenced by varieties and levels of space.

Treatments	No. of fruits	Average fruit weight (gms)	Average fruit length (cm)	Average fruit width (cm)
60X30cm (T_1)	24.61	6.60	8.24	6.65
60X45cm (T_2)	38.78	6.64	8.39	6.63
60X60cm (T_3)	41.47	6.64	8.22	6.65
70X30cm (T_4)	30.43	6.55	8.48	6.56
70x45cm (T_5)	43.03	6.49	8.36	6.49
70X60cm (T_6)	48.81	6.76	8.93	6.68
CD at 5%	13.53	0.38	0.52	0.39

moisture and light leading to better crop growth. But the picture was quite reversed when looked into per hectare yield. This is to the simple reason that the plant population per hectare was more (40,008 plants) in closely spaced 60X30cm and (26672 plants) in 60X45cm. From the farmers' point of view yield per unit area is more important than the yield per plant. Boominathan *et al.*, (1971), Singh and Naik (1990) and other earlier workers are in agreement with the present findings.

The interaction effects of varieties and spacings were non-significant with respect to all the parameters studied except for the number of fruits, and yield per plant. The interaction of Pusa Jwala (R1) with the widest spacing (T_6 – 75 X 60cm) resulted in the higher per plant yield (350.187 gms) (Table 1). The interaction of Longsa variety (R2) with the widest spacing (T_6) resulted in highest average weight of the fruit as Longsa variety is a variety with better fruit width and length. This observations is due to higher quantity of raw materials needed for better photosynthesis which is provided by widers spacing. But none of the interacttions which proved better for fruit pa-rameters reached the level of R_1T_2 (76.69 Q/ha) and induce significant interaction effects on yield per hectare. From the present study, it can be conculted that the variety Pusa jwala is much superior in terms of the total yield (67.95 Q/ha) with the spacing of 60X45cm as the highest yield/Ha. Even though the total number of fruits and yield per plant was highest in the spacing of 75X60cm, the total yield/ha was more in 60X45cm spacing as a result of more plant population. Since the total yield is more important to a farmer, it can be therefore concluded that closer spacing of 60X45cm with more plants is preferable.

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MANAGEMENT OF SOIL PESTS IN POTATO (*SOLANUM TUBEROSUM* L.)

LANUNOCHETLA & TOSHIMENLA

Abstract

A field experiment was conducted at SARS, Yisemyong during Kharif season 2008 to manage the soil pest in potato by using four different insecticides. It was revealed that potato crop treated with Deltamithrin Decis 2.8 EC applied during land preparation, 30 DAP and 60DAP gave highest tuber yield and also effectively control against all soil pest infesting potato.

INTRODUCTION:

Potato popularly known as the king of vegetables has emerged as one of the most important food crop. It is a wholesome and nutritious food which made it an essential part of everyday meal in the whole world over. The area and production in India are on an increase, however the insect pests and diseases are among the several factors limiting potato yield. This caused most problems to potato farmers. Potatoes are attacked by a great diversity of insect pest, however only a dozen of them are responsible for economic loses in one region based on their mode of feeding and habitat. The insects are broadly classified into soil pests, sucking pests, defoliating pests and storage pests. Among the soil pest, red ants, cut worms and white grubs are found to be the serious ones. In Nagaland during 2006-2007 the area and production of potato was 3500ha, and 31420 MT respectively. (Statistical handbook of Nagaland 2007). Farmers in Nagaland are very interested in potato cultivation, yet the pests and diseases are becoming a major setback in its production considering the importance's of these problems the present experiment has been carried out.

MATERIALS AND METHODS:

The experiment was conducted at SARS Yisemyong which is located at 1050MSL to study the effectiveness of different insecticides on soil pests during kharif 2008. The soil of the experimental site was sandy clay loam with a PH of 5.38, testing High

in availability of organic carbon (2.11%), available phosphorus (8.00kg/ha) and available potassium (71.68kg/ha). The experiment was laid out in RBD with 5 treatments and replicated thrice. The treatments were T_1=Deltamithrin (Decis 2.8%E.C), T_2=Phorate 10G T_3= Chlorpyriphos (Trail 20% E.C), T_4=Neem shield and T_5 as control. The planting was done on 14th March '08 with a row spacing of 50cm and plant to plant spacing of 30cm. during land preparation FYM @ 4kg/sq.m and recommended dose of NPK were applied, in the whole cropping period Indofil was applied thrice within an interval of 15 days to check late blight of potato. The different treatments were applied thrice within an interval of 30days.

TABLE I: - Effects of different insecticides on Yield and percentage of infestation in potato.

Treatments	Weight healthy tubers (kg)	Weight infested tubers (kg)	% of infestation	Yield Q/ha
T_1=Deltamithium	4.875	0.070	1.51	98.90
(Decis 2.8 % E.C)				
T_2=Phorate 10G	2.637	0.537	17.01	63.48
T_3=Chlorpyhorous	2.762	0.240	8.29	60.04
(Tricel 20% E.C)				
T_4=Neem shield	0.587	1.462	66.10	40.98
T_5= Control	0.107	1.737	77.29	36.88
CD at 5%	1.084	0.446	20.296	-
SEm±	0.351	0.145	6.586	-

RESULTS AND DISCUSSION:-

From the table I, it was recorded that T_1 (Deltamethrin) gave the highest yield of tuber with a mean of 4.87 kg weight of healthy tuber followed by T_3 (Chlorpyriphos) with a mean of 2.76 kg healthy tuber. Were T_3 was slightly superior to T_2 which is in conformity to the findings of Nisha et al., (2004).Who reported that phorate 10G was not very effective against soil pest and that tuber yield was highest in potatoes treated with

Chlorpyriphos T_4 (Neem shield) gave the lowest yield among the treatments but superior over the control.

The weight of infested tubers was highest in T_5 i.e. control with a mean of 1.737kg followed by Neem shield, phorate 10G and Chlorpyriphos with a mean of 1.462 kg , 0.537 kg and 0.240 kg respectively. The weight of infested tubers was least in T_1 i.e. Deltamethrin treated plots, with a mean of 0.070 kg.

When the infestation percentage was taken into account, it was observed that the highest was obtained from control plots with a mean of 77.29% followed by Neem shield, phorate 10G, Chlorpyriphos with a mean of 66.10%, 17.01% and 8.29% respectively. The least % of infestation was recordedfrom T_1 i.e. Deltamethrin treated plots with a mean of 1.51%.

CONCLUSION:

Potato crop treated with Deltamethrin Decis 2.8 % E.C) three times in the whole cropping period i.e. 1st application during land preparation 2nd application at 30 DAP and 3rd application at 60 DAP gave the best result followed by Chlorpyriphos (Trial 20% E.C) against all soil pest infesting potato.

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TO DETERMINE THE YIELD OF DIFFERENT GENOTYPE OF LOCAL COLOCASSIA (*Colocassia esculenta schott.*) IN MON DISTRICT, NAGALAND

S. SOSANG JAMIR

Abstract

Colocassia is one of the important crop use as a staple food and vegetable and also for fodder in Mon district. Since no detail studies has been done so far on the crop.Therefore,a field experiment was conducted during Kharif 2012,to determine the yield of different genotype of local cultivars of Colocassia.The study revealed that local cultivars exhibited significant variations on yield.Heighest yield (152.96 Q/ha) was recorded from cultivar Mukshang which was significantly higher yield than rest of the treatments. Higher yield were also obtained from cultivar Limeh and Cultivar Nalon respectively.

INTRODUCTION:

Colocassia is the second most important cultivated crop in terms of area and production in the district. It is consumed as a stable food and vegetable and also for fodder. Many farmers cultivate the crop on commercial scale and it is the most important income generating commodity and export item from the district. The fact that; why this crop is so popular and sought after is that, many varieties cultivated in the district are location specific, fibreless, no pungency and much tastier than other varieties available in other parts of the country.

Though there are so many good local colocassia varieties that lay hidden in the district, no research work on this crop has been done to explore the potentiality by any department or Organization so far. Sensing the lacuna and to tap the hidden potential and make the crop more valuable and popular by identify the most commercially viable variety among the existing cultivars, a trial on local Genotypes was conducted .

The main aim of the trial was to screen out the most potential Genotype giving the highest yield among the local cultivars and to coin local common names to each

identified type to avoid duplicity in naming as it has been observed that different names are used in different villages/Locality for the same type in the district. After establishing the foundation work of identifying the potential Genotype and coined the common name, next line of research works on different parameters will follow. Thus, keeping in mind the above mentioned objective, 10 nos. of local cultivars were collected from different locations in the entire district and an experiment was conducted at Jangwan longpang Project at Mon Town during Kharif 2012.

MATRIALS AND METHODS:

A fallow land measuring 2000 sqm. was cleared and burn during the month of February 2012 at Jongwanl ongpang project Mon town. The Project site is situated at 740 msl. The soil was clay loam in texture with soil PH (6.09),electrical conductivity (0.2 mmhos/cm),high in organic carbon (0.80%),low in available phosphorus (9.0 kg/ha) and low in available potassium(43.2 kg/ha).The experiment was laid out in a randomized block design with 3 replications.Treatments comprised of ten local cultivars of colocassia. Planting materials (Corms) were collected from 5 different villages and out of that, 10 most promising local cultivars were screened out with the help of local experts. The identified cultivars were as follows; Yangpi, Baise, Limeh, Mukshang, Aham, Tongmei, Baikhi, Nalon, Tonghei, Hoakto. Sowing was done on 13th April 2012 at a spacing of 40cmx40cm. Throughout the growing period 4 times intercultural operations were done. Parameters on morphological Characters, incidence of Insect pests and diseases were recorded from time to time. With the help of local experts characteristics on various aspect such as shelf life, utility, cooking value and adaptability etc were also recorded. Except minor incidence of shoot borer, no disease attack was noticed. The crop was harvested on 27th November 2012. Throughout the experiment period starting from seed collection till harvest, few selected local expert farmers were involve for sharing and get indigenous knowledge.

RESULTS AND DISCUSSION:

Table,1.Influence of different genotype of local colocassia on its growth, yield and other characters.

Treatments (Variety)	Plant Height(cm)	Yield(q/ha)	Shelf life (open air)	Maturity	Cooking quality
T_1=Yangpi	68.87	115.50	Can preserve for 11 months	Late	Take longer time to cook
T_2=Baise	56.80	103.70	4-5 months	-do-	-do-
T_3=Limeh	70.60	142.20	9-10 months	-do-	Cook easily
T_4=Mukshang	48.93	152.96	6-7 months	-do-	-do-
T_5=Aham	46.00	99.07	4-5 months	early	-do-
T_6=Tongmei	83.13	106.66	9-10 months	Late	-do-
T_7=Baikhe	77.47	101.29	9-10 months	early	-do-
T_8=Nalon	80.00	141.00	4-5 months	-do-	Longer time
T_9=Tonghei	73.20	98.88	8-9 months	-do-	Cook easily
T_{10}=Hoakto	54.73	105.50	9-10 months	-do-	-do-
CD(P=0.05)	2.99	4.29			
S.Em±	1.00	1.73			

PLANT HEIGHT:

A close scrutiny of the data in table-1,indicates that plant height was significantly influenced by the different local cultivars of colocassia. It was revealed that maximum plant height(83.13cm) was exhibited by cultivar Tongmei in treatment(T_6) which was signifycantly higher than rest of the cultivars and followed by cultivar Nalon in treatment(T_8).The shortest plant height (46cm) was recorded from cultivar Aham from treatment(T_5).All the cultivars showed significant variations in plant height except treatments (T_4& T_5; T_{10} & T_2 and treatments(T_1&T_3) which were at par with each other.

YEILD:

A perusal of data revealed that signifycant variations among the different genotypes were recorded in respect of yield. Maximum colocassia yield (152.96 q/ha)was recorded from cultivar Mukshang in treatment

(T_4) which was significantly higher than rest of the cultivars.Higher colocassia yield were also obtained from cultivars Limeh in treatment (T_3) and cultivar Nalon in treatment T_8 respectively. Lowest colocassia yield(98.88 q/ha) was registered from cultivar Tonghei in treatment (T_9) which was statistically at par with cultivar Baikhe in treatment (T_7).

Conclusion:

It can be concluded from this study that local cultivar Mukshang is the most potential genotype giving maximum colocassia yield per unit area followed by cultivars Limeh and cultivar Nalon. These existing local cultivars may be cultivated on commercial scale for income generating commodity and export item from the district.

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Foreward

In the context of modern Agriculture, research oriented technological pack stopping is a must which is the most vital keys to success in our endeavor to build up a sustainable production and achieve food security. SARS, Yisemyong and its sub-station being the premier institute for agricultural research in the state, all relevant and need base research works are taken up in the station since its inception and will continue to do so in future. Today it has become a destination for researchers, scientists and educational tours.

SARS,Research Publication volume -1 *has unravel the numerous research works done over the years by the scientists of the station which will become an invaluable assets as reference book and for future research works .The research results when put into practice will surely benefit the farming community in uplifting their livelihood income.*

I am confident that the publication of this research findings will go a long way in meeting the much needed research results. I acknowledge and express my sincere thanks and gratitude to the SARS team of scientists for their dedicated and the pain that they have taken in bringing out this comprehensive research journal.

(Bendangyanger)
Director of Agriculture
Kohima, Nagaland

Preface

*It is my pleasure to present the 3rd publication of State Agricultural Research Station (SARS) yisemyong in Mokokchung. This publication is renamed as " **SARS Research Publication Vol-1**"as it covers the entire research and its findings during the period from 1993-2014, Established in the year 1988, the SARS is contributing to the overall agriculture development of the State by conducting need based research work with a view to attain sustainable production. Our scientists have continue to strive in generating crop development and production technologies on all aspects of agriculture that is tested, proven and within the farmers reach.*

I firmly believe that this reachers publication will be useful in promoting effective communication between the scientists in agriculture development and through this closed co-operation scientists are able to publish the result of the research they have undertaken.

I offer my sincere thanks to Director of Agriculture for his kind approval to publish this journal

I offer my appreciation and thanks to both, Dr. N. Tiameren Ao and Dr. L. Tongpang Longkumer. SASRD, NU, for sparing their valuable time in carrying out the editing.

My sincere thanks are equally due to editorial committee for compiling, reviewing and contribution made to this publication makes it a reality.

It is all and believe that this research publication will serve as a valuable guide for researcher and field functionaries.

All suggestions and support are welcome for further refinement of this publication.

Editor
Dr. Bendangyanger
Project Officer, SARS
Yisemyong, Mokokchung

About SARS

The State Agricultural Research Station (SARS) was established by the department of agriculture, Nagaland in the year 1988 under the science and technology cell of the department to attend the need based location specific research in the state. It is located under mid hill condition at an altitude of 1050m MSL at yisemyong, Mokokchung district. The climate of Yisemyong is moderate with winter temperature varying between 5°C to 22°C and summer temperature varying between 15°C to 30°C. Average annual rainfall is about 2100mm confined mainly during the months of May to October .The station is located about 17 km away from Mokokchung town. The nearest railway station and Airport from Yisemyong is located about 100Km and 118 Km away at Mariani and Jorhat in Assam respectively. The SARS is also monitoring two other sub-station which are located at Wokha (1310m MSL) and Tuli (320mMSL) for conducting research activities at different altitudinal zones.

Agriculture in the state is undergoing considerable transformation and speedy development of agriculture sector is the vital for the progress of the state. For securing maximum crop production, the best use of available land has to be made and suitable method of crop husbandry put into practice. But, this depends on the availability of scientific information and guidance on all aspects of agriculture that is tested, proven and within the farmers' reach. SARS being the front runner in the field of agriculture in the state, the need based research works are being taking up continuously inspite of so many constraints with a view to attain sustainable production.

SARS is closely linked with both national and international institutions such as ICAR, CIP, AICRIP, GIZ, IDRC, ATMA and KVKs. Of late, the research findings are transferred to KVKs and ATMAs for refinement, validation and adoption before dissemination of technologies.

MANDATE OF SARS:

- To attend to the local problems on various research activities in agricultural and allied sciences.
- To provide adequate need based and location specific research works.
- To develop each area according to its potentialities through research.
- To test,evaluate and conserve locally available crop germplasm.
- To undertake work on improvement of hill and rainfed farming system.
- To develop some alternative land use options for shifting cultivators.
- Technological transfer through front line demonstration
- To develop man power and capacity building of departmental officers and at farm level.
- To build upon traditional agriculture to a modern production system.
- To develop climate resilient technology for shifting cultivators.
- To undertake collaborative research work.

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