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Utilization of Organic Manures with Inorganic Fertilizers and effects on Growth &Yield Components of Soybean (*Glycine Max* L. Merill.)

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ABSTRACT:

The field tials were carried out to study the effect of organic manures and inorganic fertilizers on growth and yield of soybean crop (Glycine max L.). The experiment was conducted by Randomized complete Block Design (RCBD) method and soybean variety (Mahabeej) was used for cultivation. The fertilizer treatments consists of urea, 18-18, 12-32-16, FYM, poultry manures, compost manures and control crop was without treatment. The observation revealed that the poultry manures+18-18 and FYM +18-18 fertilizers had significant effect on stem diameter, number of branches, plant height and number of leaves at 30, 60, and 90 days after sowing the crop while FYM+18-18 had significant effect on plant weight as compared to the control. The results showed that PM and CM fertilizers increased the number of seeds/pod, pod weight/plant, number of seeds per plant over control.

KEY WORDS: Soybean variety, Organic manures, Inorganic Fertilizers, Poultry Manure, Growth.

INTRODUCTION:

Organic manures help to increase biological activity of soil microbes and improve soil structure, water holding capacity and other physico-chemical properties of soil (Devi *et al*., 2013). Farmyard manure supplies all major nutrients necessary for plant growth, as well as micronutrients. Hence, it acts as a mixed fertilizer (Khan *et al*., 2010). Poultry manure (PM) is widely used as an organic fertilizer that is effective in improving soil properties and crop production (Dikinya & Mufwanzala, 2010). Integration of organic and inorganic sources of nutrients along with biofertilizers is found to give higher productivity and monetary returns in soybean (Bhattacharyya *et al*., 2008). Starling *et al*., (2000) showed that plant growth and seed

yield of soybean increased when nitrogen was initially added. Phosphorus is the second important element which limits plant growth in the case of unavailability.

MATERIAL AND METHODS:

The RCBD (Randomized Complete Block Design) method was followed to study the effect of different fertilizers on growth and yield of selected variety of soybean crop. The sowing was done on the shoulder of ridges in a plot of the size of350cm. Plants treated with urea 100%, compost 100%, compost+18-18(50+50%), FYM 100%,PM100%, PM+12-32-16(50+50%),FYM+12-32-16(50+50%),compost+12-32-16,(50+50%) urea+FYM+CM+PM(25+25+25+25%),18-18(100%),12-32-16(100%),FYM+18-18 (50+50), CM (100%), PM+18-18 (50+50%), PM (100%), Compost+18-18 (50+50%).

Growth and Yield Components:

Ten plants from each plot were randomly selected and tagged, plant height was measured from a point immediately above the soil surface to the top of the plant, and then the mean andnumber of leaves per plant were obtained at 30, 60, and 90 days after sowing. From tagged plants the mean number of branches per plant was counted after 90 days after sowing.The tagged plants were harvested, for number of pods per plant, weight of pod and then pods were threshed and then number of seeds per pod was counted. The total number of seeds was counted and then means number per plants was determined. From the above samples, weight of seeds per plant was obtained. A sample of 100 seeds was taken from ten plants yield of each plot was then weighted to determine 100 seed weight for each treatment. The seed yield unit area was converted into kg/ha according to flowing equation:Yield (kg/ha) = plot yield (m2) x 10000

1000x1000

RESULTS AND DISCUSSION:Growth Aspects: The crop was treated with different manures for the measurement of plant height during first field trial and the most height was recorded with the treatment of Urea (14.04 cm 45DAS), PM+18-18(22.16cm 60DAS) and PM+18-18(28.06cm 75DAS). The lowest height was recorded with FYM treatment when alone given (Table No.1). During the second field trial the maximum height was recorded with the

treatment of (15.3cm 45DAS), PM+18-18(21.9cm 60DAS) and CM+18-18(28.7cm 75DAS). The minimum height was recorded with FYM treatment when alone given (Table No.1). The highest no. of leaves during the first field trials recorded withCM+18-18 (35 leaves 45DAS), both in CM+18-18 and PM+18-18 treatment (55 leaves 60DAS) and CM+18-18 (80 leaves 75DAS). The lowest no. of leaves recorded in control treatment. The highest no. of leaves during the second field trials recorded withPM+18-18 (35 leaves 45DAS), both in CM+18-18 and PM+18-18 treatment (48 leaves 60DAS) and both CM+18-18& PM+18-18 (89 leaves 75DAS). The lowest no. of leaves recorded in control treatment (Table 1).

Table 1: Effects of different fertilizers on plant height and No of Leaves after 30, 60 and 90 DAS during I and II field trials.

Treatment	**I Field Trial (Height & No. of Leaves)**						**II Field Trial (Height & No. of Leaves)**					
	45 DAS	**60 DAS**	**75 DAS**	**45 DAS**	**60DAS**	**75 DAS**	**45 DAS**	**60 DAS**	**75 DAS**	**45 DAS**	**60 DAS**	**75 DAS**
Control	7.4	9.7	12.4	14	28	52	8.1	9.9	12.9	12	23	48
FYM	6.6	10.1	4.8	20	25	41	6.9	10.8	8.8	16	29	47
CM	8.0	9.2	12.9	15	26	49	8.8	11.2	13.2	19	31	55
PM	7.1	10.85	14.5	29	29	58	8.1	9.9	13.7	20	25	60
FYM+12-32-16	12.0	14.68	20.6	32	31	50	12.9	15.1	12.6	28	27	54
CM+12-32-16	13.9	15.34	21.7	20	29	64	14.4	16.1	20.8	18	25	60
PM +12-32-16	14.1	14.86	24.10	28	41	79	13.8	15.2	23.9	30	45	85
Urea+YM+CM+PM	12.28	14.16	21.04	20	32	40	11.9	15.5	22.3	17	28	44
18-18	13.3	11.78	21.36	23	34	55	15.1	12.8	23.3	20	30	49
Urea	14.04	10.05	19.88	19	30	65	14.5	11.5	20.7	12	25	60
12-32-16	13.62	13.48	22.08	20	28	70	14.2	14.9	25.3	25	32	65

FYM+18-18	13.7	13.22	18.02	30	48	65	12.9	14.9	20.8	26	39	59
CM+18-18	13.62	21.64	27.06	35	55	80	13.9	20.8	28.7	29	48	89
PM+18-18	14.02	22.16	28.06	29	55	75	15.3	21.9	27.7	35	48	89

The integrated use of organic and inorganic fertilizers Different fertilizershowed significant variations in the number of branches of soybean (Table2). The highest mean value regarding the no. of branches after treatment recorded with the use of PM+18-18 (30.8 75DAS) and CM+18-18 (28.4 75DAS) and the lowest value was recorded in Urea+FYM+CM+PM (11.2 75DAS) in the first field trial. The highest mean value was recorded after treating with PM+18-18 (32.5 75DAS) followed by CM+18-18 (30.7 75DAS) and the lowest value recorded in Urea+FYM+CM+PM (12.4 75DAS) in the second field trial. The variations may be due to the availability of nutrient elements present in the soil, form of organic and inorganic sources which helped in acceleration of various metabolic processes of NPK which help in better absorption of nutrients coupled with proper distribution, these results are in conformity with the reports of Dash *et al.,* (2005).

Yield component:*Pods per plant:* The effect of different fertilizers treatments on number of pods per plant in first and second field trials was presented in (Table 3). Analysis of variance showed significant difference among treatments. The highest number of pods per plant recorded in PM+18-18 (146.0) followed by CM +18-18 (114.4) during first field trial and lowest in 18-18 (39.8) whereas highest number of pods per plant recorded in PM+18-18 (147.0) followed by CM +18-18 (116.7) during second field trial and lowest in 18-18 (40.5). It increased the number of pods plant by 20 % (Table 3).***Seeds per plant****:* The analysis of variance revealed no significant difference for this characters (Table 3). The highest number of seeds per plant recorded in PM+18-18 (36.8) followed by CM +18-18 (30.2) during first field trial and lowest in Urea (6.3) whereas highest number of seeds per plant recorded in PM+18-18 (38.9) followed by CM +18-18 (34.4) during second field trial and lowest in Urea (2.1) (Table 3).***Seeds per pod:***The highest number of seeds per pod recorded in PM+18-18 (3.1) followed by CM +18-18 (2.6) in the first

field trial and lowest in CM (1.7) whereas highest number of seeds per pod recorded in PM+18-18 (3.3) followed by CM +18-18 (3.0) during second field trial and lowest in FYM+ 12-32-16 (1.8) (Table 3).***Plant weight (g):***Analysis of variance showed significant difference among fertilizers treatments on plant weight during first and second field trials (Table 4&5). The highest mean value (62.99g) was observed after the treatment of PM+18-18 in the first field trial and lowest (19.51g) with the use of CM+ 12-32-16. During the second field trial the highest mean value was recorded from the treatment of PM+18-18 (63.70g) and lowest (21.58g) in CM+12-32-16. ***Pods weight (g*)**:Analysis of variance showed that the highest mean value in the first field trial (36.5g) was observed after the treatment of PM+18-18 and the lowest (18.4g) with the use of Urea fertilizer. During the second field trial the highest mean value was recorded from the treatment of PM+18-18 (38.78g) and lowest value (19.90g) with Urea treatment(Table 4&5).***Seeds weight (g):*** The observations of the field trials showed that different treatments affected on the seeds weight/plant (Table 4&5). The highest mean value of the seed weight per plant in the first field trial (35.64g) was observed after the treatment of PM+18-18 and the lowest (15.28g) in control. During the second field trial the highest mean value for seed weight per plant was recorded from the treatment of PM+18-18 (37.89g) and lowest value (17.45g) in control(Table 4&5).Chaturvedi and Chandel (2005) found that integrated application of 100% recommended dose of NPK+FYM@10tones ha-1 improved the biological and physiological conditions which help to improve the yield of soybean crop.***100 Seeds weight (g):***The highest mean value for 1oo seeds weight was recorded in PM+18.18 fertilizer treatments (21.6g) in first field trial and the lowest mean value was recorded in control crop. During the second field trial the highest mean was recorded (23.6g) from PM+18-18 and lowest (6.3g) from control crop (Table 4 & 5).Amaranth *et al*., (1990) reported positive correlation of seed yield with seeds/pod, branches/plant and 100-seed weight. ***Seed yield (kg/ha):***In the first field trial the mean value for seed yield was maximum after the treatment of PM+18-18 (1.7kg/ha) and the lowest value was recorded (0.15kg/ha) in FYM treatment alone. During the second field trial the highest mean value for yield was (1.9kg/ha) after PM+18-18 treatment and the lowest mean value (0.16kg/ha)

in FYM treatment alone From the point of view of statistical analysis of variance it was clear that there were significant difference among different types of fertilizers (Table 4&5).

Table2. Effect of fertilizers on the no.of branches (75 days) in I and II field trials.

Treatment	**I Field Trial (No. of Branches 75DAS)**	**II Field Trial (No. of Branches 75 DAS)**
Control	15.1	16.2
FYM	15.8	15.9
CM	17.2	17.8
PM	18.8	19.4
FYM+12-32-16	17.6	18.5
CM+12-32-16	19.4	20.3
PM +12-32-16	26.8	27.9
Urea+ FYM+CM+PM	11.2	12.4
18-18	14.8	15.7
Urea	19.2	20.6
12-32-16	22.6	25.2
FYM+18-18	20.4	22.6
CM+18-18	28.4	30.7
PM+18-18	30.8	32.5

Table 3. Effect of different fertilizers on Number of Seeds, Pods and Seeds per Pod in I and II field trials.

Treatment	**First Field Trial**			**Second Field Trial**		
	Pods/ plant	**Seeds/ plant**	**Seeds/ Pod**	**Pods/ plant**	**Seeds/ plant**	**Seeds/ Pod**
Control	60.2	11.8	1.9	61.7	2.1	9.9

FYM	69.8	12.6	2.2	70.7	2.5	13.4
CM	70.2	13.6	1.7	72.4	2.6	14.1
PM	77.8	14.1	2.1	78.4	2.2	14.4
FYM +12-32-16	83.4	13.6	1.9	85.2	1.8	13.2
CM+12-32-16	83.4	20.9	2.4	85.8	2.8	22.8
PM +12-32-16	111.4	21.3	2.5	113.8	2.9	23.5
Urea + FYM +CM +PM	57.6	12.4	2.2	59.2	2.4	14.2
18-18	39.8	9.7	2.0	40.5	2.4	10.6
Urea	63.0	6.3	2.1	65.2	2.8	8.9
12-32-16	68.2	14.4	2.2	70.3	2.7	16.5
FYM+18-18	110	29.0	2.4	113.2	2.8	30.5
CM+18-18	114.4	30.2	2.6	116.7	3.0	34.4
PM+18-18	146.0	36.8	3.1	147.0	3.3	38.9

The results displayed that there were significant differences among the different treatments on the plant height of soybean. Mohsin Zafar *et al*., (2011) indicated that a combination of chicken manure resulted in taller maize plants than either 0.05 t ha NPK or 10 t ha or chicken manure applied separately.

Table 4. The effect of different fertilizers on yield of soybean in I field trial

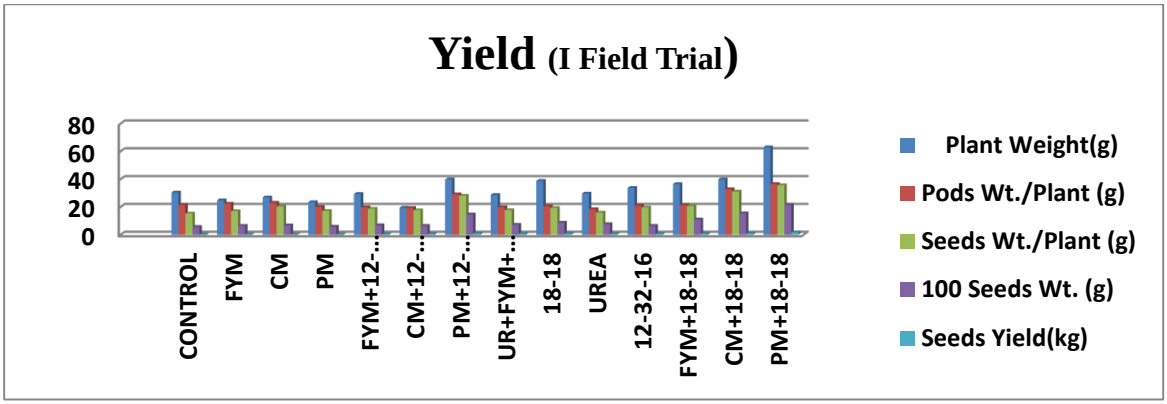
Treatments	**Plant Weight(g)**	**Pods Wt./Plant (g)**	**Seeds Wt./Plant (g)**	**100 Seeds Wt. (g)**	**Seeds Yield(kg)**
CONTROL	30.41	21.56	15.28	5.7	0.17
FYM	24.86	22.44	17.02	6.5	0.15
CM	26.92	23.06	20.32	6.8	0.17
PM	23.55	20.06	17.18	5.9	0.20

FYM+12-32-16	29.38	19.80	18.76	6.9	0.37
CM+12-32-16	19.51	19.34	17.64	6.5	0.54
PM+12-32-16	39.86	29.14	28.10	14.7	0.79
UR+FYM+PM+CM	28.73	19.78	17.74	7.3	0.73
18-18	38.85	20.56	19.36	8.7	0.74
UREA	29.7	18.4	15.98	7.7	0.64
12-32-16	33.72	21.04	19.68	6.5	0.61
FYM+18-18	36.48	21.36	20.7	11.1	0.79
CM+18-18	39.92	32.82	31.14	15.5	0.86
PM+18-18	62.99	36.5	35.64	21.6	**1**.70

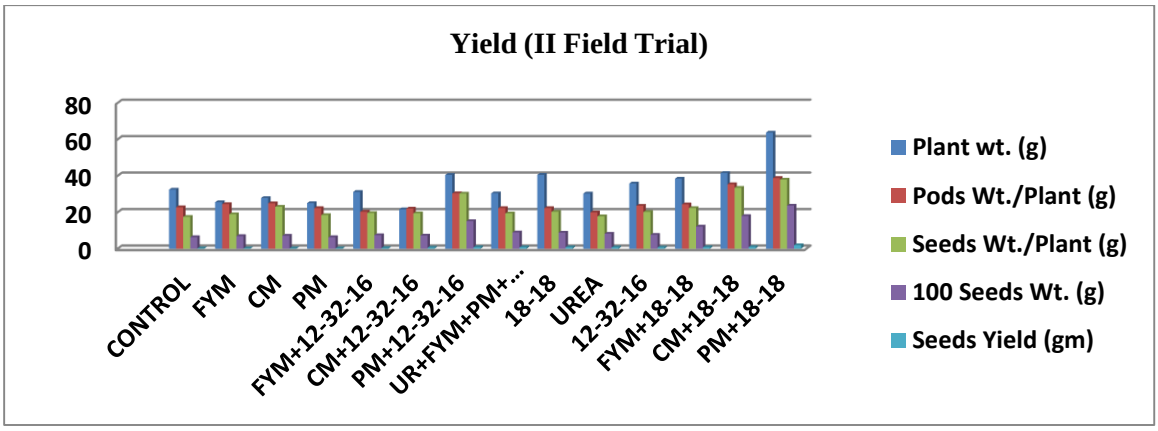
Table 5: Effect of fertilizers on the Yield of Soybean Crop in II field trial

Treatments	**Plant wt. (g)**	**Pods Wt./Plant (g)**	**Seeds Wt./Plant (g)**	**100 Seeds Wt. (g)**	**Seeds Yield (gm)**
CONTROL	32.38	22.70	17.45	6.3	0.18
FYM	25.50	24.47	18.89	6.9	0.16
CM	27.78	24.89	22.98	7.1	0.17
PM	24.98	22.24	18.46	6.3	0.21
FYM+12-32-16	31.10	20.26	19.56	7.4	0.36
CM+12-32-16	21.58	21.97	19.41	7.2	0.56
PM+12-32-16	40.45	30.38	30.23	15.10	0.81
UR+FYM+PM+CM	30.35	22.30	19.36	8.9	0.77
18-18	40.50	22.26	20.23	8.8	0.78
UREA	30.25	19.90	17.74	8.2	0.69
12-32-16	35.78	23.53	20.16	7.6	0.64
FYM+18-18	38.40	24.32	22.29	12.13	0.82
CM+18-18	41.48	35.36	33.39	17.9	0.89
PM+18-18	63.70	38.78	37.89	23.6	1.900

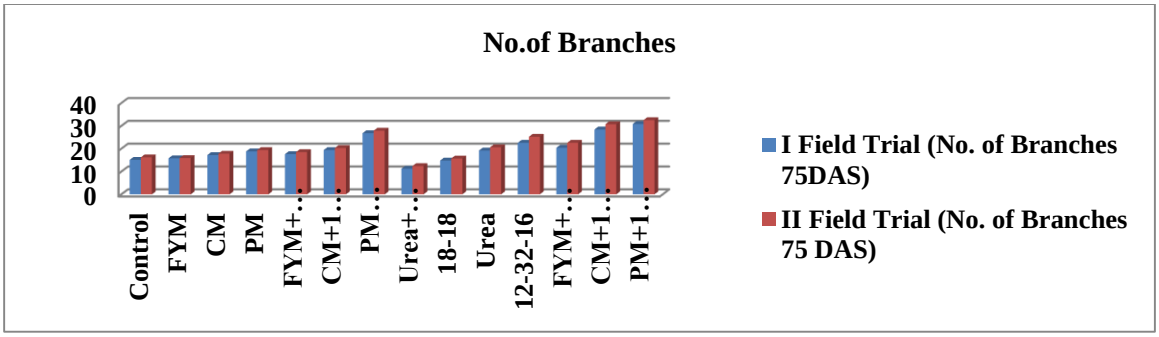
Graph 1:



Graph 2:



Graph 3:



These results are in agreement with the findings of Babalad (1999) in soybean, who obtained that there is a need of organics application along with inorganic fertilizers. Myint *et al.,* (2009)

reported that application of poultry manures stimulated plant growth. Seeds weight increased under nitrogen fertilization as indicated by Akbari *et al.*, (2001).

CONCLUSIONS: Organic and Inorganic fertilizers showed effects on the growth, yield and of soybean.Integrated use of fertilizers showed positive effect compared to control crop. Due to physiological and environmental conditions along with the seasonal changes some alterations may occur and the regional topographical conditions may also be the reason for changes in plant growth and yield aspects of the crop and hence taking the view into consideration further investigations and detailed study is recommended.

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REFERENCES

Akbari P, Ghalavand A, Modarres Sanavy AM, Agha Alikhani M. (2011). The effect of biofertilizer, nitrogen fertilizer and farmyard manure on grain yield and seed quality of sunflower *(Helianthus annuus* L.). Journal of Agricultural Technology 7:173–184.Amarnath K C N, Vishuanatha S R, and Chennakeshahra B C.**(**1990). Phenotypic andgenotypic correlation coefficientof some quantitative characters in soybean. Mysore Journal of AgriculturalScience24 (4): 445-449.

Babalad H B**. (**1999). Integrated nutrient management for sustainable production in soybean based cropping system. Ph.D. Thesis, University of Agricultural. Science Dharwad (India).

Bhattacharya R, Ved Prakash, Kundu S, Ghosh B N and Gupta H S. 2008. Potassium availability as influenced by farmyard manure application under continuous soybean- wheat cropping in a Typic Haplaquept. Journal of Indian Society of Soil Science. 56(2):182-185.

Chaturvedi S.and Chandel A.S. (2005). Influence of organic and inorganic fertilization on soil fertility and productivity of soybean (*Glycine max*), Indian Journal of Agronomy. 50(4):311-313.

Dash A C, Tomar G S and Kotkar P H. (2005). Effect of integrated nutrients management of growth and dry matter accumulation of soybean (*Glycine max* (L) Merill*)*. Journal of soils and crop science 3945.

Devi KN, Singh TB, Singh NB, Shamurailatpam D. (2013). Influence of inorganic, biological and organic manures on nodulation and yield of soybean (*Glycine max Merril* L.) and soil properties. Australian journal of crop science (AJCS), 7(9):1407-1415.

Dikinya O and Mufwanzala N. (2010). Chicken manure enhanced soil fertility and productivity: Effects of application rates. Journal of Soil Science and Environmental Management.; 1:46–54.

Khan N I, Malik A U, Umer F and Bodla M I.(2010). Effect of Tillage and Farm Yard Manure on Physical Prop- erties of Soil," International Research Journal of Plant Science. 1(4):75-82.

Myint T Z, Sooksathan I, Kaveeta R and Juntakool S. (2009). Effects of Different Organic Amendments and Chemical Fertilizer on Plant Growth and Grain Yield of Soybean on Pakchong Soil Series, Kasetsart J. (Nat. Sci.) 43:432–441.

Starling, M. E. Wood, C. W. and Weaver, D. B. (2000). Late-planted soybeans respond to nitrogen starter. *Fluid Journal*.**28**:26–30.