The Bioscan 10(1): 275-278, 2015 (Supplement on Agronomy)
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
www.thebioscan.in

INFLUENCE OF AMENDED MELAMINE PHOSPHATE (AMP) AT DIFFERENT LEVELS OF FERTILIZER ON YIELD ATTRIBUTING CHARACTERS, YIELD AND NODULATION ON SOYBEAN OF CHHATTISGARH PLAIN

RAKESH KUMAR PATEL[1]*, S. B. GUPTA[1], ASHWANI KUMAR THAKUR[2], PRAFULL KUMAR[3] AND NITESH KUMAR GAWANDE[4]

[1]Department of Agricultural Microbiology,
Indira Gandhi KrishiVishwavidyalaya, Raipur - 491 001 (C.G.) INDIA
[2]Department of Agronomy,
Indira Gandhi KrishiVishwavidyalaya, Raipur - 491 001 (C.G.) INDIA
[3]Department of Genetics and plant Breeding,
Indira Gandhi KrishiVishwavidyalaya, Raipur - 491 001 (C.G.) INDIA
[4]Department of Plant Pathology,
Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia - 741 252 (W.B) INDIA
e-mail:

KEYWORDS
Phosphate
Rhizobium
Nodulation
Soybean

Received on :
02.09.2014

Accepted on :
10.01.2015

***Corresponding author**

ABSTRACT

The experiment was conducted under field conditions at Instructional cum Research Farm, IGKV, Raipur (Chhattisgarh) during *kharif*2011-12 to assess the effect of amended malanine phosphate (AMP) at variable levels of commercial fertilizers affecting grain yield in soybean. The experiment was laid out in trireplicated Randomized Block Design (RBD) with nine nutritional schedules. At 15 and 60DAS, Plant height (14.18 and 66.17 cm), number of pods/plant (34.12), grain yield (26.55 q/ha), straw yield (22.84 q/ha) and N uptake by nodules (13.96 mg/plant) were recorded significantly highest in treatment T_2 (*Rhizobium* inoculation + 100% RDF). However, number of nodules/plant (80.00 per plant) was recorded significantly higher in T_6 (*Rhizobium* inoculation + 75% RDF + amended melamine phosphate soil application) but fresh weight of nodules (0.825 g/plant), dry weight of nodule (0.187 g/plant) and N contain of nodules (6.89 mg/plant) were recorded significantly highest in T_9 (*Rhizobium* inoculation + 75% RDF + amended melamine phosphate soil application + foliar application).From the above study it can be concluded that combined application of *Rhizobium* inoculants along with amended melamine phosphateis suitable combination to increase soybean productivity inChhattisgarh plain.

INTRODUCTION

Soybean (Glycine max L.) is one of the most important oilseed crops globally (Chaudhary *et al.*, 2014). It is referred as wonder crop as it contains 40 % good quality protein and 20 % oil high in essential unsaturated fatty acids (Layek *et al.*, 2014).In Chhattisgarh state, Inherent low levels of soil fertility status, population of crop beneficial microbes including *Rhizobium* and resource scarce situations are now recognized among the basic causes of low productivity. Improvements in biological nitrogen fixation can help to enhance soybean productivity per unit area. In Chhattisgarh, the area, production and productivity of soybean was 1.33Mha, 1, 48,228.84 tones and 1.114 tones ha^{-1}, respectively, while at national level the area, production and productivity was 9.95 million hectares, 12.57 million tones and 1.264 $tonesha^{-1}$, respectively (Anonymous, 2010). The melamine has high nitrogen content (66.6%), so that about two third of its weight is nitrogen, if it could be used as fertilizer material, it would be provide a good deal of nitrogen (**www.**google.com/patents/us5139555). However, melamine phosphate is much more expensive to produce than other common nitrogen fertilizers, such as urea. It is effective as a fertilizer, it is essential that the plant nutrients are released or made available in a slow manner that matches the needs of the growing crop.

Nitrogen can be supplied to crops by biological nitrogen fixation (BNF), a process which is becoming more important for not only reducing energy costs, but also in seeking more sustainable agricultural production. The use of high-quality input including slow releasing source of nutrient like melamine phosphate with Mo, Fe and S and study about their benefits can still make a significant contribution in many soybean growing countries to increase biological nitrogen fixation as well as soybean productivity per unit area. Looking for research thrust for nutrient supplement, the experiment was framed with nine treatments to assess the effect of grain yield.

MATERIALS AND METHODS

The experiment was conducted under field conditions at

Instructional cum Research Farm, College of Agriculture, Raipur (Chhattisgarh) during *Kharif* 2011-12 .Spacing between plant to plant and row to row was 10 x 30 cm. All other standard agronomic package of practice were followed to raise the crop. Melamine phosphate amended with Mo, Fe, S was applied as basal soil application @ 5kg $ha^{-1}$and foliar application @ $3gl^{-1}$ at 20 and 45 DAS. Nitrogen, Phosphorus and Potassium @ 20:60:20kg ha^{-1} (100% RDF) and 15:45:15 kg ha^{-1} (75% RDF) was applied as basal through urea, single super phosphate and murate of potash (MOP). The experiment was laid out in Randomized Block Design (RBD) with three replications. The treatments comprised of 9 nutritional schedules.This study was planned with different treatments (T1: Absolute Control *i.e.* no fertilizers and no rhizobial inoculation, T2:Inoculation of Rhizobium +100% RDF, T3: Inoculation of Rhizobium + 75%RDF, T4: Inoculationof Rhizobium + Soil application of amended melamine phosphate, T5: Inoculationof Rhizobium + Foliar application of amended melamine phosphate, T6: Inoculationof Rhizobium +75%RDF + Soil application of amended melamine phosphate, T7: Inoculation of Rhizobium +75%RDF+ Foliar application of amended melamine phosphate, T8: Inoculation of Rhizobium + Soil and foliar application of amended melamine phosphate and T9: Inoculation of Rhizobium +75%RDF+ Soil and foliar application of amended melamine phosphate). Healthy soybean seed was treated before sowing with thiram @3g kg^{-1} seed. After fungicidal treatment, soybean (JS-335) seed was inoculated with homologous effective local culture of *Rhizobium* @ 5 g kg^{-1} seed. Neutralized gum arabic and lignite were used as sticking and wetting agent. Amount of matured YEM- *Rhizobium* suspension was fixed to ensure at least 10^5 viable cells were received by every seed (Nambiar*et al.*, 1984 and Nambiar, 1985). The inoculatedseeds were kept in cool and dry shed before sowing.

RESULTS AND DISCUSSION

Table1 reveals that at 15 and 60 DAS significantly highest plant height was recorded in treatment T2 among all the treatments but remaining treatment were found at par with each other. However, at 30 and 45 DAS plant height was recorded non significant. This observation is in close agreement with Tomar *et et al.* (2004), Khutate *et al.* (2005), Tripathi (2007), Nagaraju *et al.* (2006), Paradkar and Deshmukh (2004), Lakpale and Shrivastava (2006) they also mentioned plant growth can be increased by treatment with different levels of fertilizers.

Number of nodules/plant was recorded significantly higher in treatment T6 among all the treatments but it was statistically at par with treatment T2, T9 and T7. Fresh weight of nodules were recorded significantly highest under treatment T9 which was at par with T7,T6 and T3, but in case of N content of nodule was observed significantly superior than the all treatments but it was found significantly at par with treatment T2, T7,T6,T3,T8 and T5 respectively. However, in case of N uptake by nodule was recorded significantly highest in treatment T2 among all the treatments(Table 2).Findings of the present investigation are close to observations of Zhang *et al.* (1996), who reported that significantly increased N accumulation due to treatment with different fertilizers levels. Similar findings were also reported by Prasad and Ram (1986), Alagawadi *et al.* (1993) and Quasim *et al.* (2001). They mentioned that number of nodules and biomass can be increased due to different levels of fertilizer and rhizobial inoculation. This observation is also supported by the findings

Table 1: Response of amended melamine phosphate on plant height.

Treatment	Plant height at 15 DAS(cm)	Plant height at 30 DAS (cm)	Plant height at 45 DAS(cm)	Plant height at 60 DAS(cm)
T1	10.64	23.14	47.48	52.00
T2	14.18	28.67	60.00	66.1
T3	13.62	26.85	57.05	62.14
T4	12.74	25.33	53.93	58.27
T5	10.95	25.77	54.78	59.94
T6	14.12	27.14	57.20	62.55
T7	13.88	27.21	58.35	64.37
T8	12.70	25.55	55.20	60.78
T9	14.10	28.00	58.39	64.14
CD(0.05)	2.23	NS	NS	12.07

Table 2: Response of amended melamine phosphate on nodulation by field grown soybean at 45 DAS

Treatment	No. of nodulation /plant	Fresh wt. of nodule (g/plant)	Dry wt. of nodule (g/plant)	N content of nodule(%)	N uptake by nodule (mg/*plant*)
T1	29.67	0.568	0.115	5.25	6.04
T2	79.33	0.728	0.196	7.12	13.96
T3	70.33	0.783	0.170	6.73	11.44
T4	59.00	0.703	0.148	6.19	9.16
T5	55.33	0.733	0.154	6.30	9'70
T6	80.00	0.801	0.178	6.75	12.02
T7	71.67	0.803	0.181	6.82	12.34
T8	63.67	0.745	0.157	6.35	9.97
T9	77.67	0.825	0.187	6.89	12.88
CD(0.05)	8.43	0.04	0.03	0.63	0.73

Table 3: Response of amended melamine phosphate on yield of field grown soybean at harvest

Treatment	No. of pods/plant	Straw yield (q/ha)	Grain yield (q/ha)
T1	22.52	22.84	15.75
T2	34.12	44.51	26.65
T3	28.50	38.08	23.65
T4	23.68	32.86	19.76
T5	25.50	33.88	20.00
T6	29.60	38.75	23.92
T7	31.47	39.90	24.33
T8	26.90	34.85	20.70
T9	32.14	41.09	24.90
CD(0.05)	5.03	3.56	3.32

of El-Din and Moawad (1991); Paradkar and Deshmukh (2004); Azeez and Adetunji (2008).Further, Shindhe and Soni (1981); Hassan *et al*. (1994); Gupta *et al*. (1995); Sharma and Namdev (1999); Ganeshamurthy and Raddy (2000); Gupta *et al*. (2000); Patil *et al*. (2002); Tomar *et al*. (2004). They mentioned significantly higher nodule number, fresh and dry weight was due to treatment with different levels of fertilizers.

Table 3 shows that significantly highest number of podsplant^{-1}, grain and straw yield qtha^{-1} was recorded highest in treatment T2 (100% RDF) but it was at par with treatment T9 (75%RDF+) , T7 and T6 in case of number of pods plant^{-1} and grain yield qha^{-1}, however, straw yield q ha^{-1} was at par in treatment T9.Findings of the present investigation are also close to observations of Tomar *et al* (2004), Khutate *et al*. (2005), Tripathi *et al*. (2008), and Tomer and Khajanji (2009). They clearly mentioned that grain and straw yield of soybean significantly increased by use of different levels of fertilizer.

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