International Journal of Agriculture Innovations and Research
Volume 5, Issue 1, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy) :
Received : 07/06/2016 | Accepted on : 20/06/2016 | Published : 11/07/2016

Efficacy of Newer Insecticides as Seed Dressers on The Growth Attributes of Green Gram

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***Abstract* – Seed treatment with Thiamethoxam @ 4.3 g and 8.6 g/kg, Imidacloprid @ 5ml and 10 ml /kg, Acetamiprid @ 15 g and 30 g/kg, Carbosulfan @ 30ml and 40 ml/kg, Clothionidon @ 6 g and 12 g/kg seed and Untreated control as 11 treatments replicated thrice in R.B.D were field evaluated for their efficacy against sucking pests of green gram, Var. LGG-460 at SV Agricultural College, Tirupathi during Rabi season 2008.**

The germination of seeds was not affected in case of green gram with the seed dressings of Thiamethoxam, Imidacloprid, Acetamiprid and Carbosulfan. While germination in green gram was adversely affected with Clothionidon. Biomass production was high in Thiamethoxam @ 4.3 g/kg, Imidacloprid @ 5 ml/kg, Acetamiprid @ 30 g/kg and Carbosulfan @ 30 ml/kg at 45 DAG in green gram. The maximum vigour index was, recorded in Carbosulfan @ 30 ml/kg treatment in green gram. The highest SPAD readings and left chlorophyll were recorded in the test crops in Acetamiprid @ 30 g/kg, Imidacloprid @ 10 ml/kg treatments.

***Keywords* – Thiamethoxam, Imidacloprid, Acetamiprid, Carbosulfan, Clothionidon, Seed Treatment Efficacy.**

I. INTRODUCTION

Green gram (Vigna radiate (L.) Wikczek) is nutritious legume commonly known as mungbean or mung. The Rhizobium legume symbiosis is the most significant and promising area useful for sustainable agriculture (Goel et al. 1999).

On a global basis, among the biologically fixed nitrogen, bout 70 to 80 per cent is contributed by rihizobia in symbiosis the legumes (Ishizuka, 1992). Therefore, the present study was undertaken to find out the effect of N_2 fixation on various parameters of mungbean.

II. MATERIALS AND METHODS

1. *Influence of Seed Dressing Chemicals on Germination in Green Gram*

Treatment wise germination was estimated in field as well as in the laboratory in green gram at cow pea. Fifty seeds of green gram were placed separately.

2. *Influence of Seed Dressing Chemicals on Biomass Estimation*

Fresh weight of five plants per treatment were recorded and their dry weights after cleaning, shade drying and further dried in hot air oven maintained at 75-80°C for 48 hours were recorded at 15, 30, 45 and 75 DAG.

3. *Influence of Seed Dressing Chemicals on Vigour Index*

Seed germination was tested in three replicates of 50 seeds each in germination towels in each crop as described by ISTA (1985). The seeds were placed on a moistened paper towel at equidistant and were covered by another moistened paper towel. The papers were rolled loosely and were placed up right in polythene bag in an incubator at 30/20°C for 8/16 hrs. Day/night temperature. After 15 days the papers were unrolled and the per cent of normal seedlings were considered to express germination percentage. The total length of seedlings was also measured and the data were used for the calculation of seedling vigour index (SVI) as described by Abdual – Baki and Anderson (1973). Seedling vigour index (SVI) = Total length of seedlings X Germination percentage.

4. *Influence of Seed Dressing Chemicals on SPAD Readings and Chlorophyll Readings*

SPAD readings were taken by using SPAD meter at 30 DAG in greengram crop.

From the leaf samples collected from greengram crop at 30 DAG small cut pieces of top fully opened leaves weighing 0.2 g were placed in a mortar and a pinch of calcium carbonate ($CaCo_3$) was added. The mixture was saturated with 80 per cent acetone (Extracting solvent) and the tissues were ground to a fine pulp with a pestle. The resulting supernatant liquid was transferred to a Buchner funnel containing whatman No.1 filter paper and filtered. Some more acetone was added and was ground thoroughly. This was decanted and filtered until no more pigment could be extracted. The extract was made up to 25 ml with 80 per cent acetone in a volumetric flask. The optical density of the samples was determined with spectronic -20 at a wave length of 663 nm and 645 nm using 80 per cent acetone as the blank.

The total chlorophyll content was determined by using the following formula given by Arnon (1949).

Total chlorophyll (mg/g tissue) = 20.2 (D644) + 8.02 (D663) x ----------

Where,

D = The optical density reading of the chlorophyll extract at the specific indicated wave length.

V = The final volume of the 80 per cent acetone chlorophyll extract and

W = The fresh weight in g of the tissue extracted.

III. RESULTS AND DISCUSSION

Influence of Seed Dressing Chemicals on Germination in Field Conditions

In December, 2008 sowings of green gram, the lowest germination of green gram (75.66%) in Clothionidon @ 12 g / kg and the highest germination (90.00%) was recorded in Acetamiprid @ 15 g/kg treated plots.

Influence of Seed Dressing Chemicals on Germination in Lab Conditions

The highest germination percentage (97%) of green gram in the laboratory was recorded with thiamethoxam @ 4.3g /kg and the lowest germination (91.00%) was recorded in untreated control and the differences among the different treatments in respect of seed germination were not significant.

Influence of Seed Dressing Chemicals on Biomass Estimation

The bio-mass production in green gram during December, 2008 was high (16.52 g) in the seed treatment with thiamethoxam @4.3 g/kg and Clothionidon @ 12 g/kg (23.84 g) at 15 and 30 DAG. Thiamethoxam @ 4.3 g /kg (30.84 g) and Clothionidon @ 6g/kg (36.40g) at 45 and 75 DAG. The low biomass production was in Acetamiprid @ 30 g/kg (12.68g) Imidacloprid @ 10 ml/kg (17.29 g), Acetamiprid @ 30 g /kg (23.89 g) untreated control (30.02 g) at 15, 30, 45 and 75 DAG.

Influence of Seed Dressing Chemicals on Vigour Index

The vigour index in green gram crop sown in December, 2008 was highest (2421.00) in the treatment with Carbosulfan @ 30ml/kg seed and the lowest vigour index (2039.00) was observed in Imidacloprid @ 5 ml /kg (Table 13).

Influence of Seed Dressing Chemicals on SPAD Readings

The results on the SPAD readings and chlorophyll content in leaves as influenced by different treatments at 30 DAG in the green gram crop sown in December, 2008 revealed that it was highest (39.89) at 30 DAG in Clothionidon @ 12 g/kg and the lowest value of 31.51 was observed in untreated control.

Influence of Seed Dressing Chemicals on Chlorophyll Readings

The chlorophyll contents in leaves were high (1.30) at 30 DAG in Acetamiprid @ 30 ml /kg and the lowest value (1.11) was observed in thiamethoxam @ 4.3 g/kg.

Thus no specific pattern of SPAD and chlorophyll estimations in respect of green gram crop could be established to relate to the afore said indicated vigour index or other growth promotional parameters such as brighter leaves, and high leaf chlorophyll, as compared to other treatments.

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Table 1. Influence of seed dressing insecticides on germination in greengram

Treatment	Germination (%)	
	In field condition	In lab condition (Pepri plates)
T_1 Thiomethoxam @ 4.3 g / kg	88.66 (70.10)	97.00 (80.12)
T_2 Thiomethoxam @ 8.6 g / kg	86.66 (68.64)	93.66 (74.97)
T_3 Imidacloprid @ 5 ml / kg	82.00 (64.52)	93.33 (75.49)
T_4 Imidacloprid @ 10 ml / kg	80.00 (60.48)	91.33 (73.04)
T_5 Acetamiprid @ 15 g /kg	90.00 (71.66)	94.66 (77.09)
T_6 Acetamiprid @ 30 g /kg	88.33 (70.07)	94.33 (76.83)
T_7 Carbosulfan @ 30 ml /kg	80.33 (63.90)	91.66 (73.26)
T_8 Carbosulfan @ 40 ml /kg	87.33 (69.58)	92.66 (74.67)
T_9 Clothionidon @ 6 g / kg	78.66 (64.92)	92.00 (73.86)
T_{10} Clothionidon @ 12 g / kg	75.66 (63.45)	93.00 (74.73)
T_{11} untreated control	76.66 (61.21)	91.00 (72.56)
General mean	83.09 (66.04)	93.12 (75.15)
S.Em ±	1.67	1.92
CD 5%	4.95	NS
CV%	4.40	4.43

Table 2. Influence of seed dressing insecticides on Biomass production in greengram

Treatment	Biomass production (g)			
	15 DAG	30 DAG	45 DAG	75 DAG
T_1 Thiomethoxam @ 4.3 g / kg	16.52	19.84	28.32	34.94
T_2 Thiomethoxam @ 8.6 g / kg	14.35	18.95	26.84	35.21
T_3 Imidacloprid @ 5 ml / kg	13.84	18.23	30.84	33.61
T_4 Imidacloprid @ 10 ml / kg	12.85	17.29	29.84	36.40
T_5 Acetamiprid @ 15 g /kg	14.25	23.84	25.84	35.18
T_6 Acetamiprid @ 30 g /kg	12.68	22.55	23.89	32.85
T_7 Carbosulfan @ 30 ml /kg	15.21	21.28	25.74	34.28
T_8 Carbosulfan @ 40 ml /kg	13.25	21.68	24.18	33.85
T_9 Clothionidon @ 6 g / kg	16.25	19.21	27.26	30.12
T_{10} Clothionidon @ 12 g / kg	16.21	19.06	27.15	34.84
T_{11} untreated control	12.84	19.23	24.85	30.02
General mean	14.38	20.13	26.80	33.74
S.Em ±	0.43	0.55	0.79	0.91
CD 5%	1.27	1.64	2.34	2.70
CV%	5.19	4.79	5.13	4.70

Table 3. Influence of seed dressing insecticides on Vigour index in greengram

Treatment	Germination (%)	Root length (cm)	Shoot length (cm)	Vigour index
T_1 Thiomethoxam @ 4.3 g / kg	88.00	4.06	23.84	2285.00
T_2 Thiomethoxam @ 8.6 g / kg	89.15	3.89	20.81	2384.00
T_3 Imidacloprid @ 5 ml / kg	87.25	3.93	19.28	2039.00
T_4 Imidacloprid @ 10 ml / kg	85.24	4.03	21.84	2088.00
T_5 Acetamiprid @ 15 g /kg	80.35	4.11	22.39	2186.00
T_6 Acetamiprid @ 30 g /kg	84.85	4.32	24.85	2395.00
T_7 Carbosulfan @ 30 ml /kg	89.21	3.99	26.84	2421.00
T_8 Carbosulfan @ 40 ml /kg	90.12	4.06	26.18	2098.00
T_9 Clothionidon @ 6 g / kg	91.25	4.32	22.89	2106.00
T_{10} Clothionidon @ 12 g / kg	84.26	4.21	24.36	2071.00
T_{11} untreated control	88.84	4.06	24.86	2298.00
General mean	87.13	4.08	23.46	2215.00
S.Em ±	2.56	0.11	0.64	62.50
CD 5%	NS	NS	1.91	184.39
CV%	5.10	4.72	4.79	4.88

Table 4. Influence of seed dressing insecticides on SPAD readings and chlorophyll in greengram

Treatment	SPAD	Chlorophyll (µg/g)
T_1 Thiomethoxam @ 4.3 g / kg	34.67	1.11
T_2 Thiomethoxam @ 8.6 g / kg	34.89	1.13
T_3 Imidacloprid @ 5 ml / kg	35.50	1.25
T_4 Imidacloprid @ 10 ml / kg	35.72	1.27
T_5 Acetamiprid @ 15 g /kg	39.58	1.28
T_6 Acetamiprid @ 30 g /kg	39.89	1.30
T_7 Carbosulfan @ 30 ml /kg	38.30	1.20
T_8 Carbosulfan @ 40 ml /kg	38.71	1.23
T_9 Clothionidon @ 6 g / kg	36.65	1.19
T_{10} Clothionidon @ 12 g / kg	36.82	1.21
T_{11} untreated control	31.54	1.17
General mean	36.57	1.21
S.Em ±	0.03	0.00
CD 5%	0.09	0.02
CV%	0.15	1.01