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Efficacy of Newer Insecticides as Seed Dressers on the Growth Attributes of Cowpea

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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

Cowpea commonly knowns as 'Lobia' is used as a pulse, a fodder and a green manure crop. Being rich in protein and containing many other nutrients it is known as vegetable meat. It is also a rich source of calcium and iron.

The crop gives such a heavy vegetative growth and covers the ground so well that it checks the soil erosion in problem area and can later be ploughed as green manure.

The problem of insect pests such as aphids, thrips, whiteflies, pod borers, pod bugs and other insect pests complex have also become quite serious in both the short duration crop cowpea. To manage these insects soil application of hazardous granular insecticides and sprayable chemical formulations are commonly used. As these insecticides contaminate the environment, alternatives are sought on priority. In this context, seed dressing chemicals are considered as better alternatives to protect these one test crop against the major insect pests.

II. MATERIALS AND METHODS

1. *Influence of Seed Dressing Chemicals on Germination in Cowpea*

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 $\frac{V}{W}$ X W

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

From field trials during December, 2008 (Table 16), it was observed that the germination was high (87.66 per cent) in acetamiprid @ 15 g/kg seed and the lowest germination 72.00 percent was recorded in clothionidon @ 6 g /kg. Seed and the differences among the different treatments in respect of seed germination were significant.

Influence of Seed Dressing Chemicals on Germination in Lab Conditions

The highest germination percentage (94.66%) of cowpea in the laboratory was recorded with imidacloprid @ 5ml /kg and the lowest germination (88.33%) wasrecorded 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 Production

The observations on the biomass production at 15, 30, 45 and 75 DAG as influenced by the seed treatment chemicals revealed that the highest biomass production was recorded in cowpea at in thiamethoxam @ 4.3 g/kg treated plots at 15 DAG and it was highest at 30 DAG in acetamiprid @ 15g /kg, at 45 DAG and 75 DAG the highest biomass was observed in imidacloprid @ 10 ml /kg and acetamiprid @ 15 g/kg respectively.

Influence of Seed Dressing Chemicals on Vigour Index

The vigour index in cowpea crop sown in December, 2008 was highest (2684.00) in the treatment with carbosulfan @ 30 ml /kg. The lowest vigour index of (2185.00) was observed in thiamethoxam @ 4.3 g/kg.

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 crop sown in December presented in Table 19 revealed that the SPAD readings was highest (47.56) at 30 DAG in imidacloprid @ 10ml /kg and the lowest value was recorded in untreated control (40.61).

Influence of Seed Dressing Chemicals on Chlorophyll Readings

The chlorophyll contents in leaves were high at 30 DAG in Acetamiprid @ 30 g/kg (1.97) and the lowest value (1.32) was recorded in thiamethoxam @ 4.3 g/kg.

The germination vigour index, high biomass production favourable chlorophyll parameters in acetamiprid, carbosulfan, clothionidon resulted in high seed yields in cowpea.

References

[1] Bhanot J P Batra G R Kashyap R K and Verma A N 1994 Effect of seed treatment with insecticides on germination in mustared (Brassica juncea) Seed Research 22 (2): 179-180.

[2] Charjan S K U and Tarar J C 1991 The influence of seed treatment with insecticides and fungicides on germination and seedling development of safflower. New Agricultural 2: 131-134.

[3] Drink Water T W 1997 Effect of Gaucho 70 WS on emergence rate of maize seedlings, Pflanszensheutz nachrichten Bayer 50: 3253-260.

[4] Kotlinski S 1999 Comparison of some seed dressing chemicals combination on germination and weight of pea seedlings as affected by seeds, moisture sowing time and germination temperature, progress in plant protection 39(2): 905-913.

[5] Mathatha G. Jayanthi S, Bhagyaraj D J and Suresh C K 2001 Microbial and enzymatic analysis from sandal root zone soil growing in red sandy loam. Indian Journal Microbiology 41: 219-221.

[6] Miettiness P and Echegoyen P E 1996 The effect of two pesticides (Vitavax 300 and Gaucho) on rhizobia and on the nodulation of four legumes, Agricultural and Feed Science in Finland 5:2, 203-208.

[7] Miscox J D and Isreal stain G F 1979 A method for extraction of chlorophy11 from leaf tissue without maceration. Canadian Journal of Botany 57: 1332-1334.

[8] Mote V N 1996 Influence of new insecticides as seed dressers on seed germination and initial seedling growth characters of French bean. Agriculture Science Digest Karnal. 16(3): 147-483.

[9] Ram ujagir Singh R K and Ujagir R 1999 Management of insect pests of mungbean by insecticides using seed treatment soil and foliar application. Indian Journal of Pulses Research 12:1, 82-91; 9.

[10] Ramdass S and Sivaprakasam K 1994 Effect of cowpea seed treatment with fungicides and insecticides on the seedling vigous. Madras Agricultural Journal 6: 5.

[11] Slankovic R and Medic S 1997 Investigation on the effect of insecticides on sunflower and maize seed germination capacity and germination energy sdekcija-semenarstova 4: 1-2, 205-210.

[12] Tanpure S V Moholkar P R and Mote V N 1992 effect of seed treatment with insecticides on seed germination and seedling vigous of green gram. Pestology 26: 39-43.

[13] Venkata Reddy K 1998 Studies on the effect of seed treatment with certain insecticides and fungicides on the generation and control of early pests and diseases of groundnut (Arachis hypogaea L.) M.Sc (Ag.) Thesis submitted to Andhra Pradesh Agricultural University, Hyderabad.

Authors' Profiles

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

Treatment	Germination (%)	
	In field condition	In lab condition (Pepri plates)
T1 Thiomethoxam @ 4.3 g / kg	78.66 (69.46)	92.66 (74.53)
T2 Thiomethoxam @ 8.6 g / kg	75.66 (67.22)	90.66 (72.22)
T3 Imidacloprid @ 5 ml / kg	82.33 (64.92)	94.66 (77.30)
T4 Imidacloprid @ 10 ml / kg	79.33 (62.97)	94.33 (76.37)
T5 Acetamiprid @ 15 g /kg	87.66 (62.52)	92.00 (73.92)
T6 Acetamiprid @ 30 g /kg	85.00 (60.46)	90.00 (71.80)
T7 Carbosulfan @ 30 ml /kg	84.33 (58.06)	93.33 (75.81)
T8 Carbosulfan @ 40 ml /kg	86.66 (68.64)	90.33 (72.22)
T9 Clothionidon @ 6 g / kg	72.00 (66.71)	94.00 (75.95)
T10 Clothionidon @ 12 g / kg	82.00 (64.92)	91.66 (72.22)
T11 untreated control	74.00 (59.39)	88.33 (70.10)
General mean	80.66 (64.12)	91.87 (73.86)
S.Em ±	0.96	2.09
CD 5%	2.84	NS
CV%	2.60	4.91

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

Treatment	Biomass production (g)			
	15 DAG	30 DAG	45 DAG	75 DAG
T1 Thiomethoxam @ 4.3 g /kg	27.28	25.63	35.45	42.32
T2 Thiomethoxam @ 8.6 g /kg	20.52	24.12	34.84	44.60
T3 Imidacloprid @ 5 ml / kg	22.15	26.94	33.84	41.28
T4 Imidacloprid @ 10 ml / kg	19.85	23.85	36.94	40.68
T5 Acetamiprid @ 15 g /kg	21.84	28.13	32.18	44.68
T6 Acetamiprid @ 30 g /kg	20.33	26.90	33.18	42.87
T7 Carbosulfan @ 30 ml /kg	22.18	26.89	33.54	41.20
T8 Carbosulfan @ 40 ml /kg	22.51	27.31	34.85	40.39
T9 Clothionidon @ 6 g / kg	22.36	26.84	31.84	39.88
T10 Clothionidon @ 12 g / kg	21.86	24.86	33.49	40.87
T11 untreated control	19.65	22.95	32.84	40.89
General mean	21.33	25.85	33.72	41.81
S.Em ±	0.67	0.74	1.17	1.42
CD 5%	NS	2.19	NS	NS
CV%	5.47	4.98	6.01	5.90

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

Treatment	Germination (%)	Root length (cm)	Shoot length (cm)	Vigour index
T1 Thiomethoxam @ 4.3 g / kg	88.20	5.01	22.08	2185.00
T2 Thiomethoxam @ 8.6 g / kg	90.21	4.08	20.81	2386.00
T3 Imidacloprid @ 5 ml / kg	85.84	3.98	24.85	2384.00
T4 Imidacloprid @ 10 ml / kg	84.25	4.02	26.84	2286.00
T5 Acetamiprid @ 15 g /kg	86.02	4.85	22.84	2385.00
T6 Acetamiprid @ 30 g /kg	80.12	4.39	23.84	2411.00
T7 Carbosulfan @ 30 ml /kg	82.48	4.43	20.84	2684.00
T8 Carbosulfan @ 40 ml /kg	83.21	4.88	23.85	2284.00
T9 Clothionidon @ 6 g / kg	78.92	5.02	21.84	2398.00
T10 Clothionidon @ 12 g / kg	83.65	4.68	24.85	2383.00
T11 untreated control	84.56	5.01	24.91	2486.00
General mean	84.31	4.57	23.41	2388.36
S.Em ±	2.56	0.12	0.66	71.95
CD 5%	NS	0.35	1.95	212.25
CV%	5.27	4.60	4.91	5.21

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

Treatment	SPAD	Chlorophyll (µg/g)
T1 Thiomethoxam @ 4.3 g / kg	41.57	1.32
T2 Thiomethoxam @ 8.6 g / kg	41.82	1.37
T3 Imidacloprid @ 5 ml / kg	45.33	1.75
T4 Imidacloprid @ 10 ml / kg	47.56	1.67
T5 Acetamiprid @ 15 g /kg	44.71	1.87
T6 Acetamiprid @ 30 g /kg	44.85	1.97
T7 Carbosulfan @ 30 ml /kg	43.41	1.56
T8 Carbosulfan @ 40 ml /kg	43.75	1.60
T9 Clothionidon @ 6 g / kg	42.85	1.45
T10 Clothionidon @ 12 g / kg	42.81	1.48
T11 untreated control	40.61	1.36
General mean	43.53	1.58
S.Em ±	0.17	0.01
CD 5%	0.50	0.03
CV%	0.67	1.36