NCPP 13

13-16 Dec 2013

Junagadh Gujarat

Proceedings

National Conference of Plant Physiology-2013

Current Trends in Plant Biology Research

Organised by

Directorate of Groundnut Research, Junagadh

&

Junagadh Agricultural University, Junagadh

In association with

Indian Society for Plant Physiology, New Delhi

P 4-26. SEED TREATMENT CHEMICALS FOR MANAGING SUCKING INSECT-PESTS OF GROUNDNUT

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INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop in India with an area of 5.31 million hectares and production of 6.93 metric tonnes (http://eands.dacnet.nic.in). The average crop productivity is very low (1305 kg ha^{-1}) when compared to world average (≈1680 kg ha^{-1}) (http://www.fas.usda.gov/). The lower productivity is often attributed to the abiotic and biotic (insects, pathogens and weeds) constraints which cause pre-harvest and post harvest yield losses. The sucking insect-pests *viz.*, leafhoppers and thrips cause loss in pod yield up to 22% (Vyas, 1984) and 17 to 40% (Ghewande, 1987), respectively. The literature on sucking insect-pest management through seed treatment chemicals is lacking. In this regard, a field study was carried out to ascertain the effectiveness of seed treatment chemicals on leafhoppers and thrips.

METHODS AND MATERIALS

The seed treatment chemicals from neo-nicotinoid group (imidacloprid 48 FS @ 2.0 mL kg^{-1}, acetamiprid 20 SP @ 1.0 g kg^{-1} and thiamethoxam 25 WG @ 1.0 g kg^{-1}), phenylpyrazole group (fipronil 5 SC @ 1mL kg^{-1}) and carbamate group (carbosulfan 25 EC @ 5 mL kg^{-1}) were dissolved in water, smeared over the seed surface and treated seeds shade dried overnight before sowing. The groundnut varieties, GG-20 (in *kharif*, 2010) and GG-2 (in summer, 2010) were sown with a spacing of 30 X 10 cm^2. The foliar spray of monocrotophos 36 SL @ 1.1 mL L^{-1} on 30 and 45 days after emergence (DAE) served as standard check. The treatments were arranged in a randomized complete block design (RCBD) with three replications.

Observations and statistical analysis: A modified sweep net method (Nandagopal *et al.*, 2007) was used to record the populations of the leafhoppers and thrips at 10 days interval starting from 20 days after sowing (DAS). At harvest, observations were recorded on pod yield from each experimental plot. The square root transformed insect count data and the pod yields per hectare values were statistically analyzed for ANOVA . Means were separated with the Duncan Multiple Range Test (DMRT) using critical difference (CD) at p=0.05. Cost-benefit analysis was used to evaluate the economic benefits of the seed treatments in terms of benefit-cost ratio (BCR).

RESULTS AND DISCUSSION

The differences in mean leafhopper population in *kharif* at 20, 30 and 50 DAS were non-significant for all the treatments however at 40 DAS, minimum leafhopper population (0.5 hoppers/5 sweeps) was recorded with carbosulfan and which was at par with fipronil (1.1) and the standard check (1.4). The differences in mean thrips population at 20, 30 and 40 DAS differed significantly with the standard check and untreated control. The thrips population (5.9, 2.6 and 2.0 per 5 sweeps, respectively) was minimum at 20, 30 and 40 DAS, respectively when seeds were treated with fipronil, imidacloprid and thiamethoxam.

In summer, the differences in mean leafhopper populations differed significantly only at 20 and 30 DAS. At 20 DAS, the maximum population (4.0 per 5 sweeps) was recorded with imidacloprid, which was at par with carbosulfan (6.4), fipronil (8.9) and acetamiprid (9.6). The lowest leafhopper population (1.0 per 5 sweeps) at 30 DAS was observed in standard check and differed significantly with rest of the treatments and untreated control. The differences in mean thrips populations differed significantly at 20, 30 and 40 DAS. At 20 DAS, the minimum (2.9 per 5 sweeps) was recorded with imidacloprid and which was statistically on par with carbosulfan (4.2), fipronil (5.2) and acetamiprid (6.3). At 30 DAS, the minimum population (2.6 per 5 sweeps) was recorded with the standard check, which differed significantly with rest of the treatments and untreated control whereas, at 40 DAS the standard check (6.6 per 5 sweeps) was at par with all other treatments except untreated control.

The mean leafhopper population was very low in *kharif* season (ranging from 0.5 to 7.3 hoppers/5 sweeps) and very high in summer season (ranging from 1.0 to 16.6 hoppers/5 sweeps). The mean thrips population was very high, both in *kharif* season (ranged from 2.0 to 17.3 thrips/5 sweeps) and in summer season (ranged from 2.6 to 18.6 thrips/5 sweeps) which was in agreement with the findings of Prasad *et al.*, (2008). All the seed treatment chemicals were effective up to 50 DAS in checking the population buildup of both leafhopper and thrips during both the *kharif* and summer seasons. Similarly, the seed treatment with neo-nicotinoids has protected cotton for 30-45 days period from sucking insect-pests. By looking into the effectiveness and the economics, seed treatment with thiamethoxam 25 WG @ 1g kg^{-1} and imidacloprid 48 FS @ 2 mL kg^{-1} resulted in the highest pod yield, larger increase in pod yield over control and higher value of BCR during *kharif* (1978.8 kg ha^{-1}, 30.1 % and 2.9) and summer season (1179.6 kg ha^{-1}, 47.5 % and 1.5), respectively.

CONCLUSIONS

Seed treatment with either thiamethoxam 25 WG @ 1g kg^{-1} or imidacloprid 48 FS @ 2 mL kg^{-1} may be included in IPM for sucking insect-pests.

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