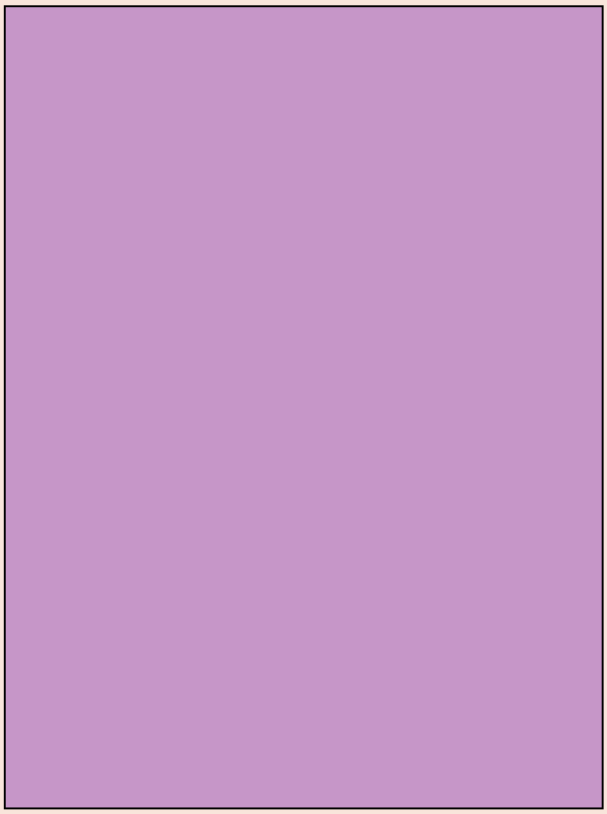
Consequence of different seed dressers for the management of seed and seedling diseases of Groundnut (*Arachis hypogaea* L.)

K. AJITHKUMAR, A.S. SAVITHA, S.A. BIRADAR AND B. RAJANNA



J. Mycopathol, Res, 55(2) : 183-186, 2017;
ISSN 0971-3719

Department of Botany,
University of Calcutta,
Kolkata 700 019, India

J. Mycopathol. Res. ***55(2)*** *: 183-186, 2017;* (ISSN 0971-3719)

Consequence of different seed dressers for the management of seed and seedling diseases of Groundnut (*Arachis hypogaea* L.)

K. AJITHKUMAR*, A.S. SAVITHA, S.A. BIRADAR AND B. RAJANNA
University of Agricultural Sciences, Raichur 584 104, Karnataka

Received : 07.04.2017 Accepted : 10.04.2017 Published : 31.07.2017

A field experiment was laid out with ten treatments including recommended fungicides, penflufen 154 + trifloxystrobin 154-308 FS and untreated control to find the effective chemical for management of seed rot (*Aspergillus niger*), collar rot (*Aspergillus pulverulentum*) and stem rot (*Sclerotium rolfsii*) diseases. Among the tested fungicides, seed treatment with combi-product of penflufen 154 + trifloxystrobin 154-308 FS at 1 ml kg^{-1} seed recorded mínimum incidence of seed rot (3.00%), collar rot (4.33%) and stem rot (8.67%) diseases with maximum pod yield (16.42 q ha^{-1}) and haulm yield (23.03 q ha^{-1}). The treatment also recorded highest B:C ratio of 2.06 followed by penflufen 154 + trifloxystrobin 154 – 308 FS (0.8 ml kg^{-1}) which recorded a B:C ratio 1.90. Both the treatments recorded significant superiority over tebuconazole 2 DS (1 g kg^{-1}). The seed treatment with penflufen 154 + trifloxystrobin 154-308 FS at 1 ml kg^{-1} seed was effective in managing both seed and seedling disases with maximum yield (16.42 q ha^{-1}) along with highest BC ratio.

Key words: Collar rot, fungicides, groundnut, seed rot, stem rot

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is one of the three economically important oilseeds largely produced in India. It serves as a source of cash for many small scale farmers; and also earning millions of dollars through export. Groundnut is an important food source containing greater than 50 per cent edible oil with high protein and fat content (Chuan Tang Wang *et al*. 2011). The crop is grown in over 100 countries with a total estimated area of 21.8 mha with the production of 28.5 mt. In India, it was grown over an area of 0.419 mha with an annual production of 5.62 mt and productivity of 1341 kg ha^{-1} during 2011-12 (www.fao.org, 2012).

In Karnataka, the crop occupies an area of 0.106 mha with the production of 1.08 mt (Thamaraikannam *et al*. 2011). Groundnut is grown under both subsistence and commercial systems. Under commercial cultivation, it is grown mainly as a sole crop with high levels of inputs whereas under subsistence conditions both sole crop and intercropping has been observed. Several factors are responsible for low productivity among which diseases like leaf spot, collar rot, stem rot, bud necrosis, etc., are very important. Out of all, seed and seedling diseases viz., seed rot (*Aspergillus niger*), collar rot (*Aspergillus pulverulentum*) and stem rot (*Sclerotium rolfsii*) are the major limiting factors and also are an economically important seed and soil borne pathogens causing losses up to 80 per cent (Lindsey *et al*. 2012). The severity of the seed rot, collar rot and stem rot diseases are more in sandy loam and medium black soil and most of the groundnut cultivars are susceptible to these diseases during pre and post-emergence phases (Rakholiya *et al*. 2012). The existing fungicides as seed dresser are not effective enough in the management of seed and seedling diseases of groundnut (Geleta Tarekegn *et al*. 2007). Looking to the losses due to these diseases, field testing of new combi fungicide containing penflufen 154 + trifloxystrobin 154-308 FS is necessary as a seed treatment. Experiment was conducted for two years to find out effective seed dresser fungicide for the management of seed rot, collar rot and stem rot diseases.

MATERIALS AND METHODS

The field experimental site was located at experimental block of Main Agricultural Research Sta-

*Corresponding author : ajithk.path@gmail.com

tion, University of Agricultural Sciences, Raichur extending over two years. The district is characterized by semi-arid conditions having a sandy loam, red and black soils with an average annual rainfall of 720 mm. The field trials were conducted during *Kharif* seasons of 2013 and 2014 with high incidence (>45%) of seed and seedling diseases of groundnut being noticed during previous seasons.

KRG-1, a susceptible groundnut cultivar commonly cultivated by the farmers was used as a susceptible cultivar in the experiment. Seeds harvested from crop cultivated during 2012-13 were obtained, then the seeds treated just before sowing with all the testing fungicidal chemicals at respective concentrations, with at most care taken with regard to seed coat while treating the seeds. The total slurry volume of the new combi-product penflufen 154 + trifloxystrobin 154-308 FS was made up to 8 ml kg^{-1} seeds including the chemical. The experimental layout was randomized block design having plot size of 5.0 X 3.0 m. with three replications. All the agronomic practices were followed manually as required to raise a good crop. Data on germination per cent, plant stand, seedling mortality, incidence of the diseases (stem rot, collar rot and stem rot), dry pod yield, haulm yield and phytotoxicity of the chemical were recorded timely. The recorded data was analyzed statistically and the disease incidence was analyzed after transferring the original values to arc sine values.

RESULTS AND DISCUSSION

The pooled data of two seasons over 2013 *Kharif* and 2014 *Kharif* depicted in Table 1 revealed that, minimum disease incidence (seed rot – 3.67%, collar rot – 3.67% and stem rot – 8.50%) was recorded in the seed treatment with penflufen 154 + trifloxystrobin 154-308 FS at 1 ml kg^{-1} seeds followed by penflufen 154 + trifloxystrobin 154-308 FS at 0.8 ml kg^{-1} seeds (seed rot – 6.0%, collar rot – 6.17% and stem rot – 11.17%) and tebuconazole 2 DS at 1 g kg^{-1} seeds (seed rot – 10.17%, collar rot – 10.0% and stem rot – 6.5%) which were significantly superior over untreated control where the maximum incidence of the disease was observed (seed rot – 15.5%, collar rot – 13.17% and stem rot – 22.67%) (Table 1). Many seed dressing fungicides were reported to be effective against seed and seedling diseases of groundnut (Gangopadhyay *et al*. 1996; Karthikeyan, 1996). Seed treatment with thiram or captan has been found effective for the management of both pre-emergence and post emergence diseases of groundnut (Agnihotri and Sharma, 1972).

All treatments were found to be significantly superior over control with respect to dry pod and haulm yield of groundnut (Table 2). Pooled data over two seasons shows that, the maximum pod and haulm yield (16.80 and 23.93 q ha^{-1} respectively) was recorded in the treatment penflufen 154 + trifloxystrobin 154-308 FS at 1 ml kg^{-1} seeds with the maximum BC ratio of 2.06 and found superior over penflufen 154 + trifloxystrobin 154-308 FS at 0.8 ml kg^{-1} seed (pod yield -15.40 q ha^{-1}, haulm yield - 22.45 q ha^{-1} and BC ratio 1.90) and significantly superior over tebuconazole 2 DS at 1 g kg^{-1} seeds (pod yield - 14.62 q ha^{-1}, haulm yield - 22.09 q ha^{-1} and BC ratio 1.82). However, the minimum yield (pod-10.47 q ha^{-1}, haulm-15.43 q ha-1) and the least BC ratio of 1.31 was recorded in untreated control.

The phytotoxicity was assessed visually for two *Kharif* seasons of groundnut at seedling stage. No visual phytotoxic symptoms like adverse effect on germination, leaf injury, wilting, necrosis, epinasty, hyponasty on groundnut crop were observed with all the tested fungicides at their respective concentrations as well as at double dosage.

The seed rot (*Aspergillus niger*), collar rot (*Aspergillus pulverulentum*) and stem rot (*Sclerotium rolfsii*) are more important seed and seedling diseases of groundnut causing high economic loss and expressing the symptoms during pre and post-emergence phases of the crop. The data of the experiment revealed that, the minimum disease incidence with maximum yield and B:C ratio were recorded in seed treatment with penflufen 154 + trifloxystrobin 154-308 FS at 1 ml kg^{-1} seed followed by penflufen 154 + trifloxystrobin 154-308 FS at 0.8 ml kg^{-1} and tebuconazole 2 DS at 1 g kg^{-1} without any adverse phytotoxic effect on the crop.

ACKNOWLEDGEMENTS

The main author is sincerely thankful to the Director of Research, University of Agricultural Scieces, Raichur for providng necessary facilities and the Bayer Crop Science, Hubli for extending the financial assistance through out the period of research work.

Table 1 : Effect of seed treatment with different fungicides on seed and seedling diseases of groundnut

Tr. No.	Treatments	Dosage (kg^{-1} seeds)	Pooled Disease Incidence (%)		
			Seed rot	Collar rot	Stem rot
T_1	Untreated control	–	15.50 (23.18)	13.17 (21.28)	22.67 (28.43)
T_2	Penflufen 154 + Trifloxystrobin 154-308 FS	0.6 ml	8.83 (17.29)	10.67 (19.07)	17.50 (24.73)
T_3	Penflufen 154 + Trifloxystrobin 154-308 FS	0.8 ml	6.00 (14.18)	6.17 (14.38)	11.17 (19.52)
T_4	Penflufen 154 + trifloxystrobin 154-308 FS	1.0 ml	3.67 (11.04)	3.67 (11.04)	8.50 (16.95)
T_5	Penflufen 240 FS	0.64 ml	3.83 (11.29)	10.83 (19.21)	18.50 (25.47)
T_6	Trifloxystrobin 500 SC	0.3 ml	12.67 (20.85)	9.50 (17.95)	9.83 (18.27)
T_7	Carboxin 37.5 + Thiram 37.5-75 DS	3 g	6.00 (14.18)	12.00 (20.27)	18.00 (25.10)
T_8	Mancozeb 75 WP	3 g	12.17 (20.42)	12.17 (20.42)	11.00 (19.37)
T_9	Tebuconazole 2 DS	1 g	10.17 (18.60)	10.00 (18.43)	6.50 (14.77)
T_{10}	Thiram	2 g	7.17 (15.53)	11.00 (19.37)	20.83 (27.15)
	S. Em±		0.75	0.69	0.94
	CD (5%)		2.22	2.06	2.79

* Figures in parenthesis are arc sine values

Table 2 : Effect of seed treatment of different fungicides on pod yield and haulm yield of groundnut

Tr. No.	Treatments	Dosage (kg^{-1} seeds)	Pooled Yield (q ha^{-1})		
			Pod	Haulm	BC Ratio
T_1	Untreated control	—	10.47	15.43	1.31
T_2	Penflufen 154 + trifloxystrobin 154-308 FS	0.6 ml	12.29	18.06	1.52
T_3	Penflufen 154 + trifloxystrobin 154-308 FS	0.8 ml	15.40	22.45	1.90
T_4	Penflufen 154 + trifloxystrobin 154-308 FS	1.0 ml	16.80	23.93	2.06
T_5	Penflufen 240 FS	0.64 ml	13.89	20.51	1.71
T_6	Trifloxystrobin 500 SC	0.3 ml	14.02	20.67	1.73
T_7	Carboxin 37.5 + Thiram 37.5-75 DS	3 g	13.10	19.86	1.60
T_8	Mancozeb 75 WP	3 g	12.74	19.58	1.58
T_9	Tebuconazole 2 DS	1 g	14.62	22.09	1.82
T_{10}	Thiram	2 g	11.40	16.83	1.40
	S. Em±		0.48	0.43	
	CD (5%)		1.43	1.27	

REFERENCES

Agnihotri, J.P. and Sharma, M.P. 1972. Efficacy of fungicides in controlling collar rot of groundnut. *Acta Agron. Acad. Sci. hung.* **21:** 222-225.

Chuan Tang Wang, Yue Yi Tang, Xiu Zhen Wang, Dian Xu Chen, Feng Gao Cui, Yu Cheng Chi, Jian Cheng Zhang and Shan Lin Yu. 2011. Evaluation of groundnut genotypes from China for quality traits, *ejournal.icrisat.org,* **9:** 1-5.

Gangopadhyay, S., Bhatia, J.N. and Godara, S.L. 1996, Evaluation of fungicides for the control of collar rot of groundnut, *Journal of Mycology and Plant Pathology,* **26**: 278-279.

Geleta Tarekegn, Purshotum K., Sakhuja, Wijnand J., Swart and Tana Tamado. 2007. Integrated management of groundnut root rot using seed quality and fungicide seed treatment, *International Journal of Pest Management,* **53**: 53-57.

Karthikeyan, A. 1996. Effect of organic amendments,

antagonist *Trichoderma viride* and fungicides on seed and collar rot of groundnut, *Plant Disease Research,* **11**: 72-75.

Lindsey D. Thiessen and Jason E.Woodward. 2012. Diseases of peanut caused by soilborne pathogens in the Southwestern United States international scholarly research network. *ISRN Agronomy*, 1-9.

Rakholiya K.B., Jadeja K.B. and Parakhia A.M. 2012, Management of collar rot of groundnut through seed treatment, *International Journal of Life Science and Pharmaceutical Research,* **2**: 62-65.

Thamaraikannam, M., Palaniappan, G. and Dharmalingam, S. 2011. Market Survey. *Groundnut: The King of Oilseeds*, pp. 23.