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ASSESSMENTS OF YIELD LOSS OF GROUNDNUT DUE TO STEM AND POD ROT

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ABSTRACT

Field experiments were conducted during *kharif*-2007 and *kharif*-2008 at farm of department of plant pathology, college of agriculture, Junagadh Agricultural University, Junagadh for assessment of yield losses due to stem and pod rot of groundnut. Susceptible variety of groundnut GG-20 was selected for assessment of yield loss. Minimum stem and pod rot disease incidence and maximum pod yield (2093kg/ha) was recorded in seed treatment with vitavax power 3g/kg seeds + furrow application of *T. harzianum* @1.5 kg/ha mixed in 300kg fym/ha at the time of sowing + three sprays of hexaconazole (0.005%) at 35, 55 and 75 days after sowing in protected plots. The yield loss was 856 kg/ha recorded in unprotected plot. The pod yield loss 40.89 % was recorded in groundnut due to stem and pod disease in unprotected plot.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is a leguminous oilseed crop native of Brazil in South America (Hammons, 1982). Groundnut has a wide range of adaptability to varying agro-climatic conditions and soils, which has made its cultivation possible in most of the tropical and subtropical countries in the world. Groundnut is the major oilseed crop of India accounting for 29 per cent of global area and 36 per cent production. The total area under groundnut cultivation in India during the year 2007-08 was 6.41 million hectares and total production was 9.36 million tones with the productivity of 1460 kg/ha (Anon., 2008). The major Indian groundnut growing states are Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra which together account for about 80 per cent of area and 81 per cent of production (Reddy, 1992). Gujarat ranks first with the production of 3.3 million metric tons grown in an area of 1.9 million hectares with productivity of 1776 kg/ha (Anon., 2008a). In Gujarat, Saurashtra region with 85 and 81 per cent of area and production, respectively it is considered as the groundnut bowl of the country and has a vital role in the agricultural economy of Gujarat as well as India.

Among the soil-borne fungal diseases of groundnut, stem and pod rot caused by *Sclerotium rolfsii* Sacc. is a potential threat to groundnut cultivation in *kharif* season. This disease causes severe damage near maturity and yield losses over 25% have been reported by Mayee and Datar (1988). The disease is widespread causing significant yield losses in Bolivia, China, Egypt, India, Taiwan, Thailand and United State of America. In India the disease is more severe in Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh, Orissa and Tamil Nadu (Krishnakanth *et al.*, 1999). Losses in the range of 25 to 50 per cent of crop have been reported in the United States by Aycock (1966). The yield loss up to 27 per cent in groundnut due to this disease was also reported from India (Chohan, 1974). Therefore, keeping in view the economic importance , experiments were conducted to find out exact loss due to stem and pod rot of groundnut.

MATERIALS AND METHODS

Field experiments were conducted during *kharif*-2007 and *kharif*-2008 at Department of Plant Pathology, College of Agriculture, JAU, Junagadh. The experiment was laid out in randomized black design keeping plot size of 5.00 m × 3.60m. Sowing of groundnut was done during *kharif* season at a spacing of 60 cm × 10 cm. GG-20 groundnut variety is most popular in Gujarat and susceptible to stem and pod rot disease. Hence, GG-20 groundnut cultivar was selected for assessment of yield losses due to stem and pod rot. All agronomic recommended practices were adopted to raise the crop. Plots were artificially inoculated with *Sclerotium rolfsii* grown on sand-maize medium @ 450g/plot added at the time of sowing. The treatment was found most effective in integrated stem and pod rot of groundnut management was selected for further assessment of avoidable yield loss.

Disease was managed in protected plots with seed treatment of thiram 37.50% + carboxin 37.50% (vitavax power, 75 WP) @3g/kg seeds + furrow application of *T. harzianum* @1.5 kg/ha mixed in 300kg fym/ha at the time of sowing + three sprays of hexaconazole (0.005%) at 35, 55 and 75 days after

sowing. At the time of harvesting the number of healthy and infected plants was counted in each treatment and per cent disease incidence was calculated by using following formula (Kokalis-Burelle *et al.*, 1992).

$$\text{Percent disease incidence} = \frac{\text{No. of infected plants/plot}}{\text{Total no. of plants/plot}} \times 100$$

Pod yield was recorded after harvest of crop. The yield increased in protected plot was calculated by subtracting yield of unprotected plot from protected plot. Per cent yield loss was calculated using following formula

Given by Nagaraja *et al.* (2007).

$$\text{Percent yield loss} = \frac{Pt - Pc}{Pt} \times 100$$

Where,

Pt = Yield (kg/ha) in protected plot

Pc = Yield kg/ha in control plot

RESULTS AND DISCUSSION

The data presented in Table-1 revealed that the stem and pod-rot of groundnut disease was managed through application of seed treatment with vitavax power 3g/kg seeds + furrow application of *T. harzianum* @1.5 kg/ha mixed in 300 kg fym/ha at the time of sowing + three sprays of hexaconazole (0.005%) at 35, 55 and 75 days after sowing. Seed treatment with Vitavax power 75that combiproduct of thiram 37.50% + carboxin 37.50% and become a broad spectrum for control of collar rot as well as stem rot disease through seed treatment. *Trichoderma harzianum* as a fungal biocontrol agent for parasite sclerotia of *S. rolfsii* before germination also act as a mycoparasite on mycelium of *S. rolfsii*. Hexaconazole is broad spectrum triazole fungicide, which prevent sclerotial germination, inhibition of mycelial growth of *Sclerotium rolfsii*. Hexaconazole is also recommended for control of leaf spots of groundnut. The stem and pod-rot disease was managed through above treatment, and disease controlled upto 54.19 per cent in the protected plot as compared to unprotected. The protected plot pod yielded was recorded 2093 kg/ha. While unprotected plot pod yield was recorded 1237 kg/ha. Under artificially inoculated conditions, 40.98 per cent avoidable pod yield loss was recorded in susceptible cultivar GG-20. High stem rot disease incidence and economic yield loss in groundnut have been reported from India and abroad. Similar result was obtained by Aycock (1966) reported pod yield loss of 25 to 50 per cent has been reported in USA. In India losses in groundnut yield to the extent of 27 per cent have been reported in Kanpur from Uttar Pradesh by Singh and Mathur (1953). Garren (1959) estimated the losses to peanut growers in the Southern United Stated as 10 to 20 million dollars annually. Mayee and Datar (1988) recorded 25 per cent yield losses due to *S. rolfsii* in groundnut. Ray (1994) reported that the *S. rolfsii* caused considerable loss upto 59% in groundnut production. Mehan *et al.* (1995) have reported 10 to 25 per cent pod yield losses in groundnut and can reach over 80 per cent in heavily infested fields. Kansara and Sabalpara(2015) reported that avoidable loss of grain yield was estimated to be 34.27 % due to leaf spot of niger. Chopada and Rakholiya(2015) reported that the avoidable yield loss of turmeric due to leaf blotch (*Taphrina maculans* Butler) was estimated to be 36.95% at Navsari and 36.36% at Tarkani village of Surat district and 71.70% and 72.97% disease was controlled by protecting the turmeric plots at Navsari and Tarkani , respectively.

From above discussion it concluded that to prevent loss due to stem and pod rot of groundnut, application of seed treatment with vitavax power 3g/kg seeds + furrow application of *T. harzianum* @1.5 kg/ha mixed in 300 kg fym/ha at the time of sowing + three sprays of hexaconazole (0.005%) at 35, 55 and 75 days after sowing for managed stem and pod rot of groundnut and reduced yield loss.

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Table 1: Incidence of stem and pod rot and pod yield loss in groundnut

Treatment	Pod yield (kg/ha)*	Yield increase over control (kg/ha)	Avoidable yield loss (%)	Percent disease incidence	Percent diseased controlled over unprotected
Protected	2093#	856*	40.89*	29.98(24.97)**	54.19
Unprotected	1237	-	-	47.59 (54.51)	-
S.Em.±	15.09	-	-	0.756	-
CD at 5%	45.78	-	-	2.295	-
CV %	12.56	-	-	15.59	-

* Mean of three replications # Mean of two years

**Figures in parenthesis are retransformed values

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