

RESEARCH ARTICLE

Effect of bio-pesticides and fungicides on tikka disease of groundnut (*Arachis hypogaea* L.)

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ABSTRACT

A field experiment was conducted during *Kharif* 2011 at Central Research Farm, SHIATS, Allahabad, Uttar Pradesh under rainfed condition to study the relative efficacy of bio-pesticides of different Neem products (leaf extracts @ 2.5 and 5.0 %, seed kernel extract @ 5%, oil @ 1%) and two fungicides (Ergon 50 SC @ 0.1% and Bavistin 50 WP @ 0.1%) to control *Cercospora* leaf spot (Tikka disease) of groundnut caused by *Cercospora arachidicola* and *Cercosporidium personata*. All the bio-pesticides and fungicides were significantly superior in controlling Tikka disease of groundnut over check. The efficiency of bio-pesticides and fungicides to control Tikka disease was in order of Ergon 50 SC @ 0.1% > Bavistin 50 WP @ 0.1% > Neem leaf extract @ 5% > Neem seed kernel extract @ 5% > Neem leaf extract @ 2.5 % > Neem oil @ 1%.

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INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is one of the most promising oilseed and universal crop. It is grown in both *Kharif* and *Rabi* seasons. Unshelled seeds of groundnut contain about (48 - 50 %) oil. It is important not only for its oil content, but it is also a rich source of protein (24 - 25 %). Groundnut oil is good for cooking which does not contain health deteriorating uric acid (as in mustard). Groundnut cultivation normally suffers with leaf spot known as Tikka disease that appears during warm and humid *Kharif* season. It generally appears from the early flowering to the pods maturity stage and its development depends upon the cultivar used, growing period and environmental conditions. Many times the groundnut crop is exposed to late rains, due to high humidity and warm temperature, then *Cercospora arachidicola* (early leaf spot) and *Cercosporidium personata* (late leaf spot) develop distinctly distinguishable symptoms on leaves. The symptoms of ELS are sub-circular to irregular, 1 to 10 mm in diameter; lesions are commonly dark (reddish) brown to black on the

upper surface and light brown on the lower leaf surface. Leaf spot on upper surface is commonly surrounded by a yellow chlorotic halo. The symptoms of LLS are usually smaller and more circular than lesions of early leaf spot, 1 to 6 mm in diameter and are commonly dark gray or black on the lower leaf surface. There is no yellow halo around them. The LLS is usually more severe than ELS (Sharma, 2006). Generally beginning of the appearance of spots on leaves occurs when plant is 1-2 months old. Almost all groundnut growing areas of the world become infected very early. Frequent yield reduction takes place due to severe attack by this disease. The yield losses due to Tikka disease are up to 50 % during 2002 and 2003 at the faculty of Agriculture Research Farm, University of Maiduguri, Nigeria (Izge *et al.*, 2007) and in Meghalaya yield losses were observed between 29 to 57 % (Chandra *et al.*, 1998). Keeping above view point, a field study was done to control Tikka disease through chemical fungicides and bio-pesticides (neem products), so that the possibilities of the use of neem products can be explored to control Tikka disease of groundnut.

MATERIAL AND METHODS

A field experiment was conducted during *Kharif* 2011 at Central Research Farm, Sam Higginbottom Institute of Agriculture, Technology and Sciences (Deemed to be University), Allahabad, Uttar Pradesh under rainfed conditions. The experimental field is situated at 25°27' N latitude 80°50' E longitude and at an altitude of 98 meter above sea level. The climate is typically semiarid to sub-tropical. The maximum temperature goes up to 47°C in summer and goes down to 1.5°C in winter. The experiment comprised of six treatments [bio-pesticides of different neem products (leaf extracts @ 2.5 and 5.0 %, seed kernel extract @ 5%, oil @ 1%) and two fungicides (Ergon 50 SC @ 0.1% and Bavistin 50 WP @ 0.1%)]. One plot was kept as untreated (check) in each replication to compare the effect of bio-pesticides (neem products) and fungicides. The experiment was carried in Randomized Block Design with three replications. The area of one plot was 2 m² with plot size of 2m x 1m. The groundnut var. Kaushal was sown for the experiment. The cultural practices were adopted as per the need of crop. The seed was sown at 30 cm row to row and 10 cm plant to plant distance.

The neem seed kernel, Neem oil, Ergon and Bavistin were procured from the local market and neem kernel extract and leaf extract were prepared in lab for which fresh leaves of neem was collected from field and washed thoroughly with water to remove the dust particles. The leaf of neem was grounded in mixer by adding distilled water till it appeared as a fine paste. In fine paste 100 ml of distilled water added and stirred well to get a homogeneous extract. The extract was squeezed by 2-3 layers of muslin cloth and after squeezing, the extract was used for spray by adding desired quantity of distilled water. Similarly, the extract of neem kernel was also prepared in lab. The neem products and fungicides were sprayed at 15 days interval after initiation of disease. Randomly five plants from each plot and in each replication were tagged to record disease intensity. The first observation was made at 45 days after sowing (DAS) and followed by three

observations at 15 days interval. The disease incidence was recorded after every spraying by using the following formula given by (Mian, 1995) :

$$\text{Disease intensity (\%)} = \frac{\text{Sum of all disease ratings}}{\text{Total number of leaves} \times \text{maximum grade}} \times 100$$

RESULTS AND DISCUSSION

The effect of bio-pesticides (neem product) and fungicides on Tikka disease of groundnut has been given in Table 1, which is clearly showing that the application of neem products as bio-pesticides and fungicides were found significantly superior over check to control Tikka disease of groundnut. Among all the bio-pesticides and fungicides, per cent disease index (PDI) was lowest with application of ergon @ 0.1 % (32.27 %) over control (41.78 %). The impact of other fungicides and bio-pesticides on per cent disease index (PDI) was in decreasing order of bavistin @ 0.1 % (32.83 %) > neem leaf extract @ 5.0 % (38.94 %) > neem seed kernal extract @ 5.0 % (39.17 %) > neem leaf extract @ 2.5 % (39.99%) > neem oil @ 1.0 % (40.22 %). These bio-pesticides and fungicides were significantly superior in controlling Tikka disease over control (check). The per cent disease control (PDC) was observed maximum with application of ergon @ 0.1 % (35.67) followed by bavistin @ 0.1 % (33.67), neem leaf extract @ 5.0 % (11.00), neem seed kernal extract @ 5.0 % (10.00), neem leaf extract @ 2.5 % (07.54) and neem oil @ 1.0 % (06.01). Overall, foliar spray of Ergon 50 SC @ 0.1 % was found superior in managing the Tikka leaf spot (Table 1). The results are in conformity with the findings of Nandgopal and Ghewande (2004) in which they have stated that foliar application of 2 per cent aqueous neem leaf extract reduced the early leaf spot by 13.6 per cent and increased pod yield by 26.1 per cent. As per results of Dubey *et al.* (1995) the chemical fungicides (bavistin) was also found effective to control leaf spot and which increased the yield of groundnut but the chemical fungicides are more costlier than neem products.

The yield of groundnut has been presented with Fig. 1, which is clearly indicating that chemical fungicides like Ergon

Table 1 : Effect of different neem products and fungicides in the management of tikka disease of groundnut

Treatments	60 DAS	75 DAS	90 DAS	Percentage disease control (PDC)
Neem leaf extract (2.5%)	20.346 (26.78)	29.513 (32.90)	41.326 (39.99)	7.542
Ergon 50 SC (0.1%)	14.216 (22.14)	20.440(26.85)	28.590(32.27)	35.670
Neem seed kernal extract (5.0%)	19.996 (26.49)	27.960 (31.88)	39.996 (39.17)	10.006
Neem leaf extract (5.0%)	19.703 (26.35)	26.926 (31.42)	39.553 (38.94)	11.002
Neem oil (1.0%)	20.586 (26.92)	30.810 (53.71)	41.770 (40.22)	6.014
Bavistin 50 WP (0.1%)	15.256 (22.95)	20.883 (27.13)	29.476 (32.83)	33.676
Water (control)	23.106 (28.73)	35.363 (36.45)	44.443 (41.78)	00.00
LSD (<i>P</i> ? 0.05)	2.211	3.965	2.234	

Note: Figure in parentheses are mean per cent disease index (PDI)

50 SC @ 0.1 % gave maximum yield followed by Bavistin as compared to bio-pesticides. Among the bio-pesticides (neem products), Neem seed kernal extract @ 5 % gave maximum yield followed by Neem oil @ 1 %, Neem leaf extract @ 2.5 %, Neem leaf extract @ 5 %, as compared to check. All the treatments were found to be statistically significant over water control.

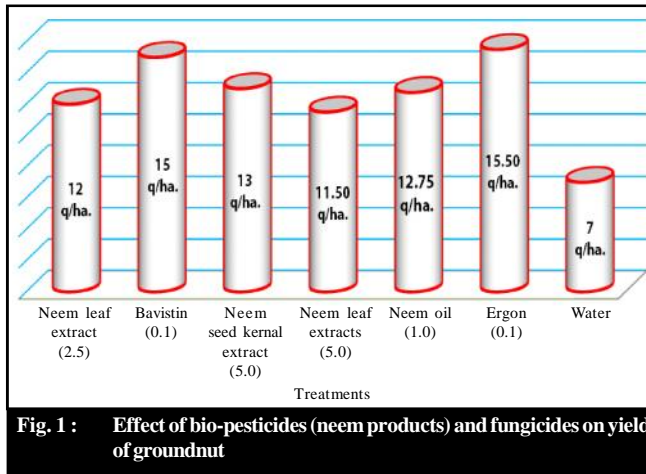


Fig. 1 : Effect of bio-pesticides (neem products) and fungicides on yield of groundnut

Conclusion :

The finding of the study indicated that chemical fungicides were more effective but expensive to control leaf spot of groundnut. However, the use of bio-pesticides (neem products) will give low cost protection technology that will

help the poor and marginal groundnut grower farmers of the country.

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