



Studies on Tikka Disease of Groundnut (*Arachis hypogaea L.*) In Purvanchal Region of Eastern Uttar Pradesh

*Drinkal Yadav, and Prof. **Ravindra kumar

*Research scholar ** Professor

Plant pathology Lab, M.L.K, (P.G) college Balrampur, Utter Pradesh, 271201

ABSTRACT :

Cercospora sp. (*C.arachidicola* & *C.personata*) is one of the most destructive pathogen, causing Tikka disease in Groundnut and there by inflicting accountable quantitative (49.30%) as well as qualitative losses. The survey studies indicated that, overall Tikka incidence was comparatively higher in *Kharif* (2020-2021) grown Groundnut crop, compared to that of *Kharif* (2021-2022) grown crop. In all the eight districts of Purvanchal region surveyed, the disease was found to be widely distributed and regular occurrence with moderate to severe incidence and it's average incidence was found maximum in the district of **Shravasti** (15.74%) followed by **Maharajganj** (15.65%) and **Gorakhpur** (15.40%) districts in the years 2020-2021 and 2021-2022. The average incidence of Tikka disease was found more in 2020-2021 (15.36%) as compared to 2021-2022 (14.79%). Of the various cultivars / varieties of Groundnut grown in the Purvanchal region, local cultivars (21.02% and 20.50%) without any proven resistance were found to suffer severely with the disease, during both the years. The most popularly grown PRAKASH was found to suffer more with about 18.90 and 18.08% (Tikka) disease incidence during *Kharif* (2020-2021) and *Kharif*, (2021-2022), respectively. However, the cultivars *viz.*, Chandra, Chitra, Amber and Kaushal were found to suffer comparatively minimum with the Tikka disease.

KEY WORDS: Groundnut, survey, *Cercospora*, Tikka disease incidence

INTRODUCTION:-

Groundnut (*Arachis hypogaea L.*) is commonly known as peanut, earth nut and monkey nut. It belongs to family Legumenaceae or Fabaceae (sub family *Papilionaceae*). the peanut or monkey nut is a leguminous crop cultivated for edible purposes. The most important useful part or the part of economical importance within the crop grows under the ground as pods.

Groundnut being a nitrogen-fixing crop through the root nodule bacteria which shows symbiotic relationship and it is considered as an important crop to be cultivated in crop rotations all over the country (Desai et al., 1980). It is the source of all the nutrients required for proper growth and development therefore, known as poor men's cashew nut. Groundnut contains carbohydrates, protein, fat, vitamins and minerals. It is also a major source of edible oil and the kernel contains 44 to 50 % oil and 25 to 30 per cent protein.

The seeds develop underground and its seed is used as a source of cooking oil and in confectionary products for human consumption (Naab *et al.*, 2005). After oil extraction, the cake of groundnut is obtained as a by-product which are mainly used as cattle feed and manure.

India cultivates about 7.74 million hectares and produces 7.61 million tonnes of peanut with average yield 1486 kg ha⁻¹ (Madhusudhana, 2013). The major groundnut producing states are *viz.* Gujarat, Rajasthan, Karnataka, Andhra Pradesh, Madhya Pradesh, Maharashtra, Tamil Nadu and Uttar Pradesh. Among these states, Gujarat state having 20 lakh hectares area of peanut with its total production of about 26 lakh tonnes annually (Anonymous, 2018; Gayathri, 2018). The Gujarat states stand first in its production, while Andhra Pradesh in area. Gujarat has maximum productivity 2668 kg/ha and minimum in Himachal Pradesh 600 kg/ha (Anonymous, 2013-14a). The cultivation of Groundnut is well adapted to the conditions prevailing in **Rajasthan** and cultivated in about 0.47 million/ha. with annual production 0.90 million tones and productivity 1950 kg/ha. (Anonymous, 2013-14b). In Eastern Uttar Pradesh, groundnut is grown in kharif seasons and is one of the most important cash crops for farmers. In 2013, the world Ground nut or monkey nut production was 45.7 million tonne from 25.4 million hectare, area with an average productivity of 1796.2 kg/ha (FAO, 2013). The average yield of Rabi groundnut is around 1929 kg/ha, whereas Kharif-peanut or monkey nut is around 1712kg/ha. which is lower than major peanut growing countries (GOI, 2014). Groundnut is called as the “king of oilseed” and from the groundnut seed many food products are prepared like peanut oil, peanut butter etc. The symptom shows black lesions, usually sunken spots. The imperfect fungi produce conidia in acervuli which are hyaline, one celled (A. Jha and S. Tiwari., 2013).

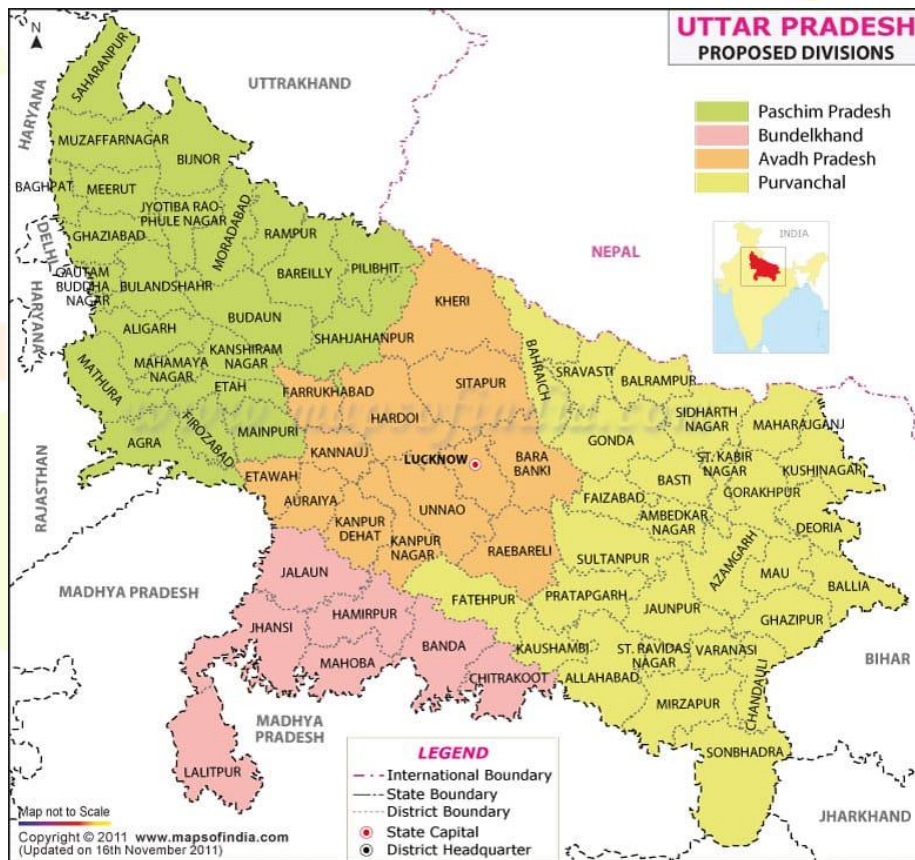
Groundnut (*Arachis hypogaea* L.) is highly affected by early leaf spot (*C. arachidicola* Horil), late leaf spot (*C. personata* (Berk and Curtis, V. Arx) and rust (*Puccinia arachidis* sp.) all over the world including India (Jackson, 1983; Melouk *et al.*, 1984; Munda *et al.*, 1997; Subhramanyam *et al.*, 1985). Among foliar diseases 3 fungal foliar diseases like, Early leaf spot, late leaf spot and rust are economically important diseases. These diseases occur wherever the groundnut crop is cultivated. But their incidence and severity varies with season and location and there can be both short and long term fluctuations in their relative proportion (Mc Donald *et al.*, 1985).

RESEARCH PROCEDURE:-

A roving survey was conducted during the *Kharif* 2020-2021 and *Kharif* 2021-2022 seasons in the Groundnut growing areas of the eight districts of Purvanchal region to assess Tikka disease incidence. Groundnut growing pockets / fields were identified from the records available at the office of Sub-Divisional Agriculture Officer of the districts to be surveyed.

The field visits were undertaken during flowering and pod formation stages of the crop. The incidence of disease was recorded by random throwing of quadrant (1 m²) in five places of a field. The numbers of healthy and diseased plants were counted in a quadrant and per cent of disease incidence was estimated by following formula.

$$\text{Disease incidence (\%)} = \frac{\text{Number of diseased plants in quadrant}}{\text{Total number of plants in the quadrant}} \times 100$$





RESEARCH ANALYSIS AND REASONING

The survey of 120 farmers fields of Groundnut crop from eight districts (Kushinagar, Deoria, Gorakhpur, Maharajganj, Basti, Sant Kabir Nagar, Shravasti and Azamgarh) of Purvanchal region of the Uttar Pradesh state was carried out during *Kharif* (2020-2021) and *Kharif* (2021-2022) seasons to record seasonal incidence of Tikka disease.

District-wise seasonal disease incidence :

Results (Table 1) revealed that in the eight districts surveyed during *Kharif* (2020-2021), the average incidence of Tikka ranged from 14.77 (Kushinagar) to 16.10 (Shravasti) per cent. However, the Groundnut crop grown in the district of Shravasti was found to suffer more with Tikka incidence of 16.10 per cent; with overall average incidence of Tikka (15.36%). The second highest average Tikka incidence of 15.82 per cent was recorded from the Maharajganj district. This was followed by the districts of Gorakhpur (15.76%), Azamgarh (15.30%), Deoria (15.27%), Sant Kabir Nagari (15.06%) and Kushinagar (14.77%) with average Tikka incidence. Comparatively minimum average Tikka incidence of 14.77 per cent was recorded in the district of Kushinagar.

Table 1 : Average incidence of Tikka(%) disease of Groundnut in Purvanchal region of Eastern Uttar Pradesh during *Kharif* 2020-2021

Sr. No.	District	No. of location	Tikka incidence
1	Kushinagar	14	14.77
2	Deoria	15	15.27
3	Gorakhpur	16	15.76
4	Maharajganj	14	15.82

5	Basti	17	14.84
6	Sant Kabir Nagari	14	15.06
7	Shravasti	15	16.10
8	Azamgarh	10	15.30
Avarage Tikkaincidence (%)			15.36

During *Kharif*, 2021-2022, Tikka incidence (Table 2) was found to be comparatively minimum to that of during *Kharif*, 2020-2021. The average incidence of Tikka ranged from 14.17 (Kushinagar) to 15.48 (Maharajganj) per cent. However, the Groundnut crop grown in the district of Shravasti was found to suffer more with Tikka incidence 15.48 per cent and; with overall average incidence of Tikka(14.79%). The second highest average Tikka incidence of 15.38% per cent was recorded from the Shravasti district. This was followed by the districts of Deoria (15.10%), Gorakhpur (15.05%), Azamgarh (14.57%), Basti (14.27%) and Sant Kabir Nagari (14.25%) with average Tikka incidence. Comparatively minimum average Tikka incidence of 14.17 per cent was recorded in the district of **Kushinagar**.

Table 2: Average incidence of Tikka(%) disease of Groundnut in Purvanchal region of Eastern Uttar Pradesh during Kharif 2021-2022			
Sr.No.	Distric	No. of locations	Tikka incidence(%)
1	Kushinagar	14	14.17
2	Deoria	15	15.10
3	Gorakhpur	16	15.05
4	Maharajganj	14	15.48
5	Basti	17	14.27
6	Sant Kabir Nagari	14	14.25
7	Shravasti	15	15.38
8	Azamgarh	10	14.57
Average Tikkaincidence (%)			14.79

Variety-wise seasonal disease incidence : In the eight districts of the Purvanchal region surveyed for recording Tikka disease incidence, a wide range of Groundnut cultivars / varieties and local varieties were grown by the farmers. The results obtained on Tikka disease incidence are presented in the Tables 3 and 4.

During *Kharif* 2020-2021, average incidence (Table 3) of Tikka on Groundnut cultivars / varieties ranged from 12.63 (Kaushal) to 21.02 (Local) per cent. However, Local cultivar of Groundnut was found to suffer more with Tikka incidence of 21.02 per cent; with overall highest average incidence of Tikka(15.36%). The second highest average Tikka incidence (18.90%) recorded on Prakash. This was followed by the cultivars *viz.*, Chitra (15.17%), CHANDRA

Table 3: Variety –wise incidence of Tikka(%) disease of Groundnut in Purvanchal region of Eastern Uttar Pradesh during Kharif 2020-2021		
Varieties	No.of locations	Average Tikka incidence (%)
Local	30	21.02
Chitra	43	15.17
Prakash	18	18.90
Amber	08	14.55
Chandra	07	15.10
Kaushal	09	12.63

(15.10%) and AMBER (14.55%) with Tikka average incidence. Comparatively minimum average Tikka incidence of 12.63 per cent was recorded on the Groundnut cv. KAUSHAL.

During *Kharif* 2021-2022, average incidence (Table 4) of Tikka on Groundnut cultivars / varieties ranged from 11.49 (Kaushal) to 20.50 (Local) per cent. However, Local cultivar of Groundnut was found to suffer more with Tikka incidence of 20.50 per cent; with overall highest average incidence of Tikka (16.32%). The second highest average Tikka incidence of 18.08 per cent was recorded on cv. Prakash. This was followed by the cultivars viz., Chandra (14.91%), Chitra (14.37%) and Amber(13.86%) with Tikka average incidence. Comparatively minimum average Tikka incidence of 11.49 per cent was recorded on the Groundnut cv. Kaushal.

Varieties	No.of locations	Average Tikka incidence (%)
Local	30	20.50
Chitra	43	14.37
Prakash	18	18.08
Amber	08	13.86
Chandra	07	14.91
Kaushal	09	11.49

Thus, perusal of the data obtained during present survey study revealed that in the region of Purvanchal, the Groundnut crop grown during *Kharif* (2020-2021) season was severely affected with the Tikka disease (*Cercospora sp.(C.arachidicola & C.personata) ciceri*) than that of the crop grown during *Kharif* (2021-2022) season. Results (Table 5) revealed that in the eight districts surveyed during *Kharif* (2020-2021) and *Kharif* (2021-2022), the average incidence of Tikka ranged from 14.47 (Kushinagar) to 15.74 (Shravasti) per cent. However, the Groundnut crop grown in the district of Shravasti was found to suffer more with Tikka incidence of 15.74 per cent; with overall average incidence of Tikka (15.07%).

The second highest average Tikka incidence of 15.65 per cent was recorded from the Maharajganj district. This was followed by the districts of Gorakhpur (15.40%), Deoria (15.18%), Azamgarh (14.93%), Sant Kabir Nagari (14.65%), and Basti (14.55%) with average Tikka incidence. Comparatively minimum average Tikka incidence of 14.47 per cent was recorded in the district of Kushinagar.

Sr. No.	Districs	No. of location	Tikka incidence (%)		Average Tikka incidence (%)
			<i>Kharif</i> 2020 – 2021	<i>Kharif</i> 2021 – 2022	
1	Kushinagar	14	14.77	14.17	14.47
2	Deoria	15	15.27	15.10	15.18
3	Gorakhpur	16	15.76	15.05	15.40
4	Maharajganj	14	15.82	15.48	15.65
5	Basti	17	14.84	14.27	14.55
6	Sant Kabir Nagari	14	15.06	14.25	14.65
7	Shravasti	15	16.10	15.38	15.74
8	Azamgarh	10	15.30	14.57	14.93
Average incidence (%)			15.36	14.79	15.07

Table 6				
Variety –wise average incidence of Tikka(%) disease of Groundnut in Purvanchal region during Kharif 2020-2021 and Kharif 2021-2022				
Sr. No.	Varieties	Tikka incidence (%)		Average Tikka incidence (%)
		Kharif 2020 – 2021	Kharif 2021 – 2022	
1	Local	21.02	20.50	20.76
2	Chitra	15.17	14.37	14.77
3	Prakash	18.90	18.08	18.49
4	Amber	14.55	13.86	14.20
5	Chandra	15.10	14.91	15.00
6	Kaushal	12.63	11.49	12.05
Average incidence (%)		17.03	16.67	16.67

Further, of the Groundnut cultivars grown by the farmers in this region, average maximum Tikka incidence during *Kharif* (2020-2021) and *Kharif* (2021-2022) on Groundnut Local cultivars (20.76%) followed by the Prakash(18.49%), CHANDRA (15.00%), Chitra (14.77%), Amber (14.20%) and Kaushal (12.05%) were recorded to suffer more by Tikka (*Cercospora sp.(C.arachidicola & C.personata) ciceri*) disease (Table 6).

The variation in the Tikka incidence within a village of different districts of Purvanchal region might be due to variation in soil type as the association and spread of Tikka pathogen is more in heavy type of soils compared to lighter one. The magnitude of Tikka incidence was higher under rainfed conditions this might be due to favourable conditions of low moisture with high temperature prevailed in crop growth period, as Tikka pathogen favours dry conditions. The black cotton soil is characterized with higher vegetation which leads to deposition of high organic amendments thereby increasing the carbon levels significantly. Rich carbon source available in black cotton soil also allows significantly high multiplication inoculums of *Cercospora* there by giving higher incidence.

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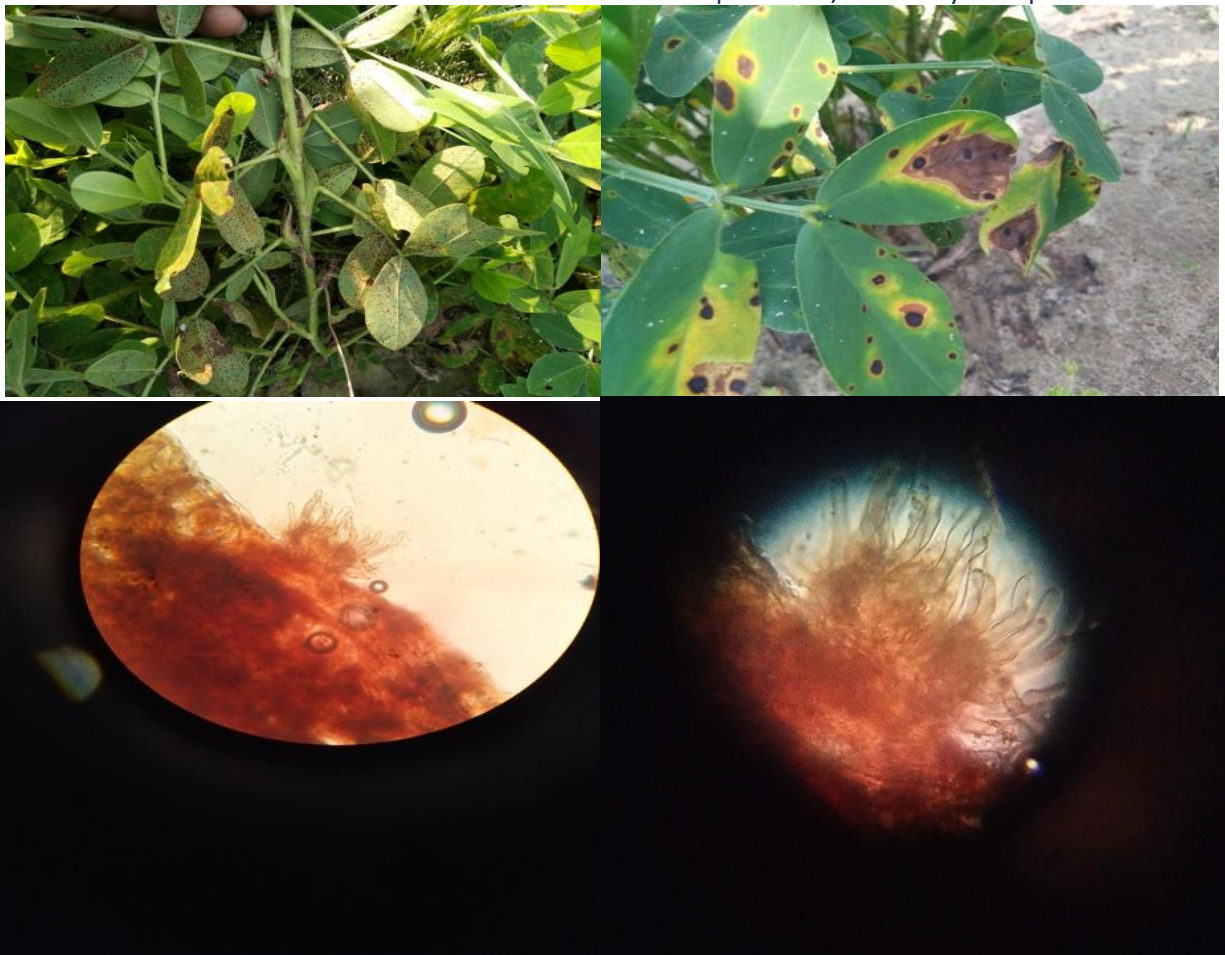
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Research Through Innovation



Survey of different crop field at different locations and their microscopic observations

