

Prevalence of Common Groundnut Disease in Different States of India

Devi Radhika¹, D Pandiarajan ²

¹Department of Chemistry, Faculty of Engineering and Technology, Jain (Deemed-to-be University), Karnataka
Email - r.devi@jainuniversity.ac.in

Abstract

Groundnut is a legume plant also known as Peanut is cultivated all around the world. Depending on the cuisines of every country ground nut is used as an ingredient in preparing various dishes. Being a globally cultivated legume and widely used crop the significance of groundnut crop is very high in farmers. But the disease variety that affects the crop drastically hampers groundnut growth, crop yield and yield quality to a great extent. The prevalence of a specific disease in particular state of Indian sub-continent is not known that hampers the growth of groundnut crop. Thus, current research puts light on finding the prevalence of different type groundnut disease in state of West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab and opens the future perspective to conduct more research on the connection of different varieties of cereals and pulses and prevalence of that specific disease in a particular state.

Keywords: Bud Necrosis, Collar Rot, Rust, Stem Rot, Tikka disease.

Introduction

Peanut is commonly termed as goober (US), groundnut, monkey nut (UK), or pindar (US), and as per classification termed a legume plant, *Arachis hypogaea*, is cultivated majorly for seeds that are edible. Groundnut is commonly grown in the tropical & subtropical, significant to large and small industrial producer. Groundnut is termed as an oil crop because of its high oil composition and as a grain legume. Global cultivation annually of shell peanut was 44 million of ton in 2016, then with 38% by China Worldwide. Peanut pods, legume crop plant, grows under the ground (geocarp) instead above the surface of the ground. Because of this property, Carl Linnaeus, the botanist termed *hypogaea*, the species known as "under the earth".

The peanut, a legume crop is included in Fabaceae botanical family also termed as Leguminosae, & usually known as *pea* or *bean*. Similar to other legume, peanut carries in root nodule the symbiotic nitrogen-fixing bacteria. The ability to fix nitrogen show that peanut increase soil fertility and needs less nitrogen-comprising fertilizer and also, creating them significant in crop rotation. Peanuts and tree nuts are similar in taste and nutritional value to almond, culinary nut, and walnut, and are usually served in alike way in Western cuisine. Peanuts (*Arachis hypogaea*) is a legume plant that belongs to South America. Peanuts are also known as earthnuts, groundnuts, and goobers. Even these are named as peanuts, peanuts are not related to tree nuts. Being a legume, peanuts are related to soy, lentils, and beans. In the United States of America, peanuts are consumed in the form of peanut butter, consumed roasted and are not eaten in the raw form. Other product of peanut include peanut flour, peanut oil, and peanut protein. Peanut products are used in many foods, like confectionery, sauces, cakes, desserts, and snacks. Peanuts are rich in fat and protein content and various other nutrients. Research shows that peanut are associated with the weight loss and reduced risk of heart disease.

Various Diseases of Groundnut Includes:

- i. Tikka Disease,
- ii. Collar Rot Disease,

- iii. Rust Disease,
- iv. Steam Rot
- v. Bud Necrosis.

1. Tikka Disease of Groundnut

Tikka disease of groundnut is a disease also termed as **Leaf spot disease**. The usual organism of tikka disease is from the genus *Cercospora* and majorly involves two species (*Cercospora arachidicola* and *Cercospora personata*). Tikka disease results in epidemics in all groundnut cultivating countries, involving the United States, China, India etc. and as per the survey, it can reduce the crop productivity by nearly 22%. Figure 1: Showing the Groundnut plant having early and late infection of Tikka Disease[1]

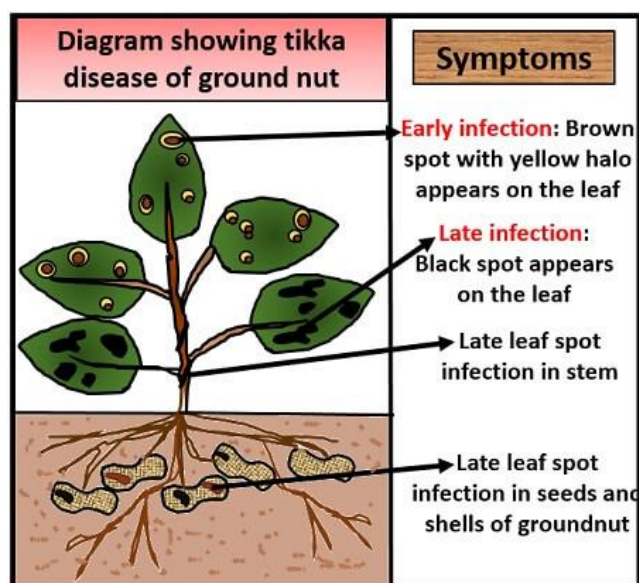


Figure 1: Showing the Groundnut plant having early and late infection of Tikka Disease[2]

Cercospora arachidicola is responsible for **Early leaf spot**, which is differentiated by the look of brown spots with a yellow halo that are very less in number and small in size. *Cercospora personata* is responsible for **Late leaf spot**, which is identified by the look of black spots that are usual, high in number and effectively more damaging[3]

Groundnut's biological name is *Arachis hypogaea*. Groundnut is high in protein content, fibres, fat and other nutrition components. As per the studies, groundnut is observed to lower cardiovascular disease. Groundnut is used in many areas in industrial application like making of edible oil, in textile factories by the use of its fibres (Ardils), cosmetic factories etc. Therefore, the tikka disease of groundnut results in high economic loss by lowering the yield groundnut. Causal Organism of Tikka Disease: The causative organism of tikka disease of groundnut comes from the genus **Cercospora** and usually includes two different species, namely *Cercospora arachidicola* and *Cercospora personata*.[4], [5].

2. Collar Rot:

Aspergillus flavus causes the disease of corn and peanut usually termed as yellow mould. Collar rot disease do not involve the yields, but the yield quality is hampered alot. , An aflatoxin, a toxic component, in the early 1960s of *A. flavus* was seen in the meal of peanut. Feed obtained with meal resulted in of 100 000 turkey death in in Great Britain. Collar rot can cause fatal liver cancer in young animals by very less amount (10-20 ppb).

Yellow mould symptoms come in early stage of the growth is highly dangerous in the tropics, with of the peanut seedlings, symptoms are also seen on pods and seeds in the soil near the harvest time [1], [3], [6], [7].

3. *Rust (Puccinia arachidis):*

It has now been a disease of major monetary significance in nearly all the groundnut- cultivating areas of the world. Symptoms: Rust (*Puccinia arachidis*) is analysed by the external look of orange pustules (uredinia) on the abaxial (lower) area of leaves and reddish brown urediniospores (uredospores)[8] Symptoms are majorly restricted to leaflets but pustules can be viewed on all the aerial portions of a plant barring the flower. Brown to dark reddish-brown pustules come-up on the lower area with the upper area creating yellow, chlorotic spots with necrotic brown portion in the center. At a late step, the primary pustules are covered by secondary sori. The uredinias are normally circular, 0.3 mm-1.0 mm in diameter, and can create on all the aerial portions of the plant except flowers and pegs [9], [10]

4. *Steam Rot:*

Stem rot is the most prevalent disease of groundnut in the United States of America. In India it happens sporadically and results in yield loss of up to 27%. Symptoms The fungus affects almost the entire plant but the stem infection is the most usual and dangerous. The branches that are in close contact or in partial vicinity with the soil start wilting. The hampered plant parts change to brown and small round bodies of the small size similar to that of a mustard seed, small seeds appear on the surface of the diseased plant tissue. The leaves changes to yellow and then changes to brown and post that desiccate. As the infection gets severely complicated, a white thread-like fungus grown near is visible in the soil surface or just next to the ground level. The whole plant may get killed or just the branches of the plants might be affected. Infection of the pegs leads to poor development of pods. Disease cycle: The fungus is disabling and has a broad range of hosts. The sclerotia can live in the soil for several years. The fungus grows readily on fallen leaves and branches. It is grown in seed borne and is available both internally and externally in the form of mycelium. Soil moisture plays a significant role in fungal infection. At 40–50% soil moisture, the infection level can be high.

5. *Bud Necrosis*

Peanut Bud Necrosis Disease (PBND) is a major Southeast Asian peanut disease. PBND, caused by and spread by Peanut Bud Necrosis Virus, Palmi Karny, Thrips. PBNV is likely to be a different species of the Bunyaviridae Tospovirus family. The first mention of PBND in India had been in 1949. In 1968, Bud Necrosis name was given, and the disease was at that previously filed different because the necrose symptoms of the bud were not documented before 1968. PBND is defined as groundnut rosette, groundnut mosaic, chlorosis, bumpy top, ring motle, bud and ring tissue since 1962 in India under at least seven different names. PBNV contaminated plants have decreased or do not yield substantially. Sites with more than 50% contamination are not rare in India and Thailand, where PBNV occurs recurringly on groundnut. PBNV includes chili, potato, onion, tobacco, mung and urd bean as well as peanut. The ICRISAT has estimated the damages incurred by the virus at more than US\$89 million a year. It was also reported that the losses are over \$89 million [11].

REVIEW OF LITERATURE

Waliyar et. al. conducted a research and analysed that rosette disease in groundnut is a prominent disease in groundnut spreaded in Africa's sub-Sahara area. Rosette disease was limited to the Africa and island in its offshore. The prime reason for annual loss of groundnut growth with more than US\$150 million. A three agent combination are included in etiology of rosette disease: GRAV (Groundnut Rosette assistor virus) belonging to Family, Luteoviridae, Genus, Umbravirus GRV and SatRNA (Satellite-RNA) in relation with Groundnut Rosette assistor virus. This information has given root regarding the growth and use of farmers cultivating groundnut having tolerance to rosette disease of groundnut and affected the life of thousands of farmer in Africa's sub-Saharan area. The current survey do not provide a data of the prevalence of groundnut disease in different states of India [12].

Okello et. al concluded that groundnut disease is caused due to of triple complex agent: assistor of rosette disease of groundnut luteo virus, rosette disease of groundnut, umbra virus, & related satellite RNA, significant disease in Uganda affecting groundnut. Significant symptom type include, green rosette and chlorotic rosette. A national study including 23 district conducted in the year 2012 and 2013 to find major symptom type of GRD, all the farmers involved in the survey knew about the disease and both the type of rosette symptom were seen, during the second monsoon they were highly visible. Out of all farmers a 42% had no plan to save from Groundnut Rosette Disease (GRD). GRD in its recent knowledge showed no significant impact on the plan, source of seed, gender of the cultivator or growing type. The rosette green variety is dominating, thus made green rosette belt of Uganda The current survey do not provide a data of the prevalence of groundnut disease in different states of India [13].

S Ganeshan et. al. concluded that pathogen fungi of plant that are grown in soil results in high loss of crop globally. With climate change, most of the crop are vulnerable to disease that are cultivated in India produced by the soil grown fungus organism. The result showed that implementation of such local micro-organism effectively reduce the stem rot and also raises the growth of the groundnut plant. The growth of plant disease control and enhancing activity and efficacy of the microbial agent are under discussion. The current survey do not provide a data of the prevalence of groundnut disease in different states of India [14].

Research Questions:

Which is the most common disease of Groundnut in West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab?

METHODOLOGY

Design:

A Questionnaire form is distributed in wholesale market of different cities of West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab. The questionnaire form shown in Table 1 was distributed amongst various wholesale grain dealers and questionnaire form filled by various wholesale groundnut dealers was considered for further analysis and depending upon the data entered by the wholesale dealer's further study was conducted.

Table 1: Shows the questionnaire form distributed amongst the wholesale dealers of grains in different cities of West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab

NAME:	
AGE:	
OCCUPATION:	
How long you are doing wholesale dealing of grains?:	2 to 6 years: 6 years or more:
What all cereals you sell?:	Wheat: Maize: Groundnut: Barley:
What quantity of Groundnut you sell monthly?:	1,000 lakh Kg: More than 1,000 lakh Kg:

Which type of Groundnut disease is observed the most?:	Tikka Disease: Aspergillus Seeding/Collar Rot/Foot Rot/Alfa Rot: Stem Rot: Rust: Bud Necrosis:
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The questionnaire form distributed amongst the wholesale dealers of different locations of West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab and an average result of different locations of a state is considered as a result.

Data Collection:

The questionnaire form distributed amongst the wholesale grain dealers of different locations of West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab and grain dealers who were mainly dealing with Ground nut primarily were considered for the survey and an average result of different locations of a state is considered as the result of that state, a total data of 10 dealers was considered for the analysis. Table 2 describes data of the disease highly affecting ground nut in different states of India.

Table 2: Shows the average result of disease that mostly affect the groundnut variety in West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab according to the data collected by the survey

State	Average result of Disease prevalence Tikka	Average result of Collar Rot prevalence	Average result of Stem Rot prevalence	Average result of Rust Disease prevalence	Average result of Bud Necrosis prevalence
West Bengal	22%	22%	11%	31%	14%
Uttar Pradesh	37%	27%	14%	13%	9%
Andhra Pradesh	28%	24%	9%	35%	4%
Punjab	50%	22%	11%	10%	7%

Data Analysis:

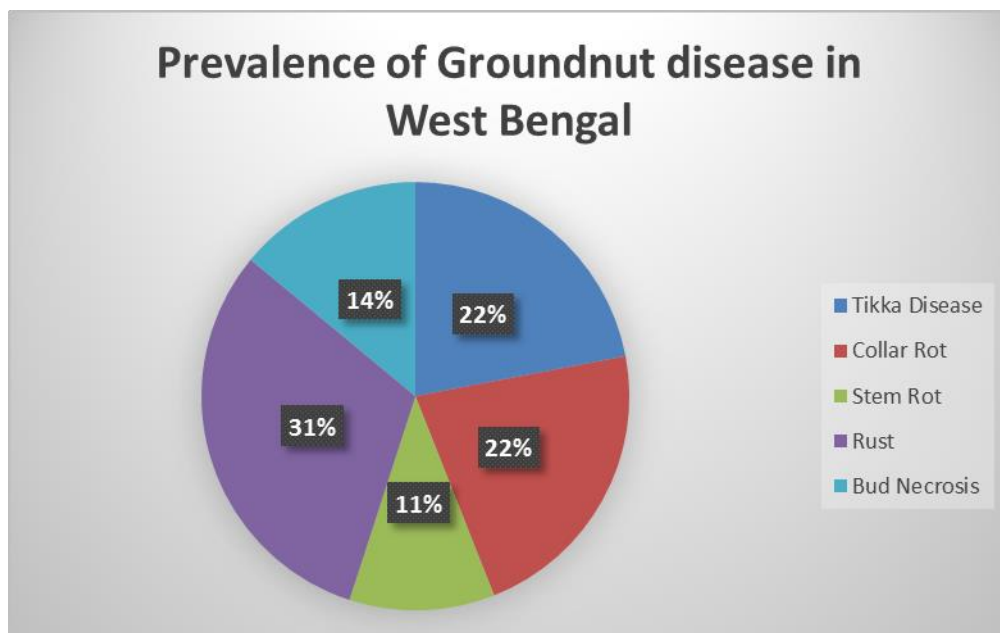


Figure 2: Shows the results of average prevalence of Groundnut disease i.e. Tikka Disease, Collar Rot, Stem Rot, Rust, and Bud Necrosis in West Bengal.

The results of average prevalence of groundnut disease i.e. Tikka Disease as 22%, Collar Rot as 22 %, Stem Rot as 11%, Rust as 31 %, and Bud Necrosis as 14% in West Bengal.

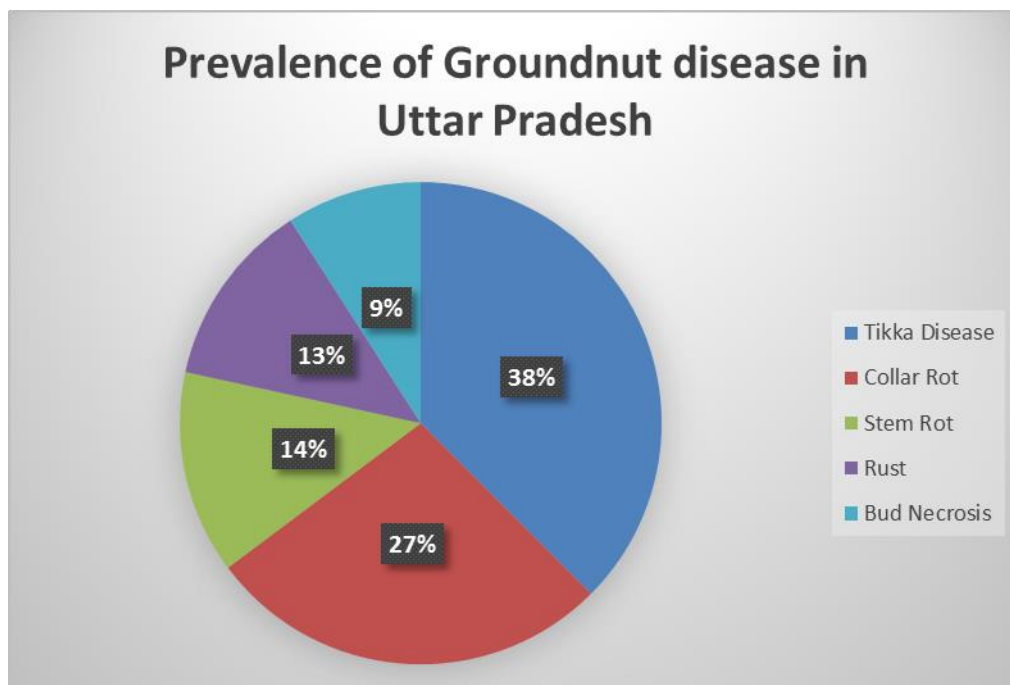


Figure 3: Shows the results of average prevalence of Groundnut disease i.e. Tikka Disease, Collar Rot, Stem Rot, Rust, and Bud Necrosis in Uttar Pradesh.

The results of average prevalence of groundnut disease i.e. Tikka Disease as 37%, Collar Rot as 27 %, Stem Rot as 14%, Rust as 13 %, and Bud Necrosis as 9% in West Bengal.

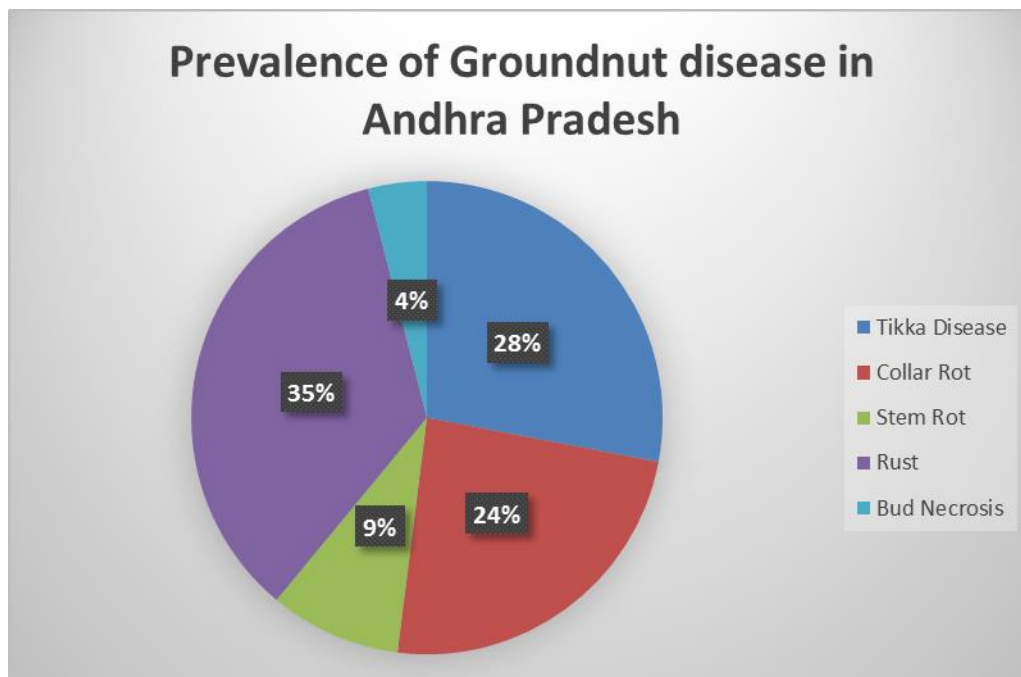


Figure 4: Shows the results of average prevalence of Groundnut disease i.e. Tikka Disease, Collar Rot, Stem Rot, Rust, and Bud Necrosis in Andhra Pradesh

The results of average prevalence of groundnut disease i.e. Tikka Disease as 28%, Collar Rot as 24 %, Stem Rot as 9%, Rust as 35 %, and Bud Necrosis as 4% in West Bengal

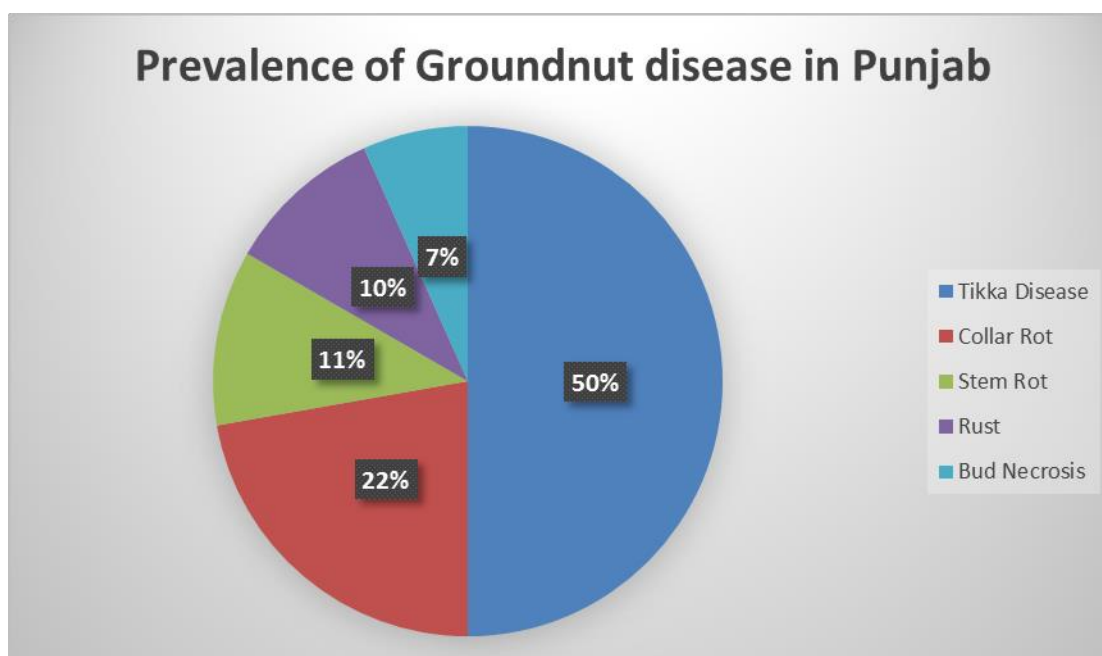


Figure 5: Shows the results of average prevalence of Groundnut disease i.e. Tikka Disease, Collar Rot, Stem Rot, Rust, and Bud Necrosis in Punjab

The results of average prevalence of groundnut disease i.e. Tikka Disease as 50%, Collar Rot as 22 %, Stem Rot as 11%, Rust as 10%, and Bud Necrosis as 7% in Punjab.

Figure 2, 3, 4, and 5, Shows the results of average prevalence of Groundnut disease i.e. Tikka Disease, Collar Rot, Stem Rot, Rust, Bud Necrosis in West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab

RESULT AND DISCUSSION

Peanut is commonly cultivated in the tropical & subtropical, significant to large and small industrial producer. Peanut is termed as both a legume grain because of high composition of oil. Global yearly cultivation of shell peanut in 2016 was 44 million ton, then 38% globally by China. A known plant crop of legume, pods of peanut grows inside the ground (geocarpy) instead of on the ground. Thus, Carl Linnaeus botanist termed *hypogaea*, the specie known as "under the earth". Peanut crop, being the legume the crop of peanut is included in the botanical family Leguminosae also termed as Fabaceae, & usually known as the *pea or bean* family. Just like mostly other legume, symbiotic nitrogen-fixing bacteria are present in root nodules of the peanut. The results of the study conducted to find out the average prevalence of different groundnut diseases i.e. Tikka Disease, Collar Rot, Stem Rot, Rust, and Bud Necrosis in different states shows that the average prevalence of Tikka Disease the groundnut diseases was 22% in West Bengal, 37% in Uttar Pradesh, 28% in Andhra Pradesh, and 50% in Punjab. The average prevalence of Collar Rot groundnut diseases was 22% in West Bengal, 27% in Uttar Pradesh, 24% in Andhra Pradesh, and 22% in Punjab. The average prevalence of Stem Rot the groundnut diseases was 11% in West Bengal, 14% in Uttar Pradesh, 9% in Andhra Pradesh, and 11% in Punjab. The average prevalence of Rust the groundnut diseases was 31% in West Bengal, 13% in Uttar Pradesh, 35% in Andhra Pradesh, and 10% in Punjab. The average prevalence of Bud Necrosis groundnut diseases was 14% in West Bengal, 9% in Uttar Pradesh, 4% in Andhra Pradesh, and 7% in Punjab. Table 2: Shows the average prevalence of different groundnut diseases i.e. Tikka Disease, Collar Rot, Stem Rot, Rust, and Bud Necrosis in West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab according to the data collected by the survey.

CONCLUSION

The results of the survey carried to find out the average prevalence of various groundnut diseases Tikka Disease, Collar Rot, Stem Rot, Rust, and Bud Necrosis in different states clearly states and shows that the average prevalence of Tikka Disease the groundnut diseases was 22% in West Bengal, 37% in Uttar Pradesh, 28% in Andhra Pradesh, and 50% in Punjab. The average prevalence of Collar Rot the groundnut diseases was 22% in West Bengal, 27% in Uttar Pradesh, 24% in Andhra Pradesh, and 22% in Punjab. The average prevalence of Stem Rot the groundnut diseases was 11% in West Bengal, 14% in Uttar Pradesh, 9% in Andhra Pradesh, and 11% in Punjab. The average prevalence of Rust the groundnut disease was 31% in West Bengal, 13% in Uttar Pradesh, 35% in Andhra Pradesh, and 10% in Punjab. The average prevalence of Bud Necrosis groundnut diseases was 14% in West Bengal, 9% in Uttar Pradesh, 4% in Andhra Pradesh, and 7% in Punjab. Thus a specific common pattern of prevalence a particular variety of groundnut diseases is observed in Uttar Pradesh and Punjab, whereas a similar pattern of prevalence of Tikka Disease, Collar Rot, Stem Rot, Rust, and Bud Necrosis is seen in Andhra Pradesh and West Bengal. Thus, current research puts light on finding the prevalence of different varieties of groundnut diseases in state of West Bengal, Uttar Pradesh, Andhra Pradesh, and Punjab and opens the future perspective to conduct more research on the connection of different varieties of cereals and pulses and average prevalence of that specific disease in a particular state.

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