

**STUDIES ON INCIDENCE OF ROOT ROT DISEASE AS INFLUENCED
BY DIFFERENT DATE OF SOWING IN GROUNDNUT (*Arachis hypogea*.,L)**

**PROJECT SUBMITTED TO THE TAMIL NADU AGRICULTURAL UNIVERSITY IN
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DEGREE OF BACHELOR OF SCIENCE (HONS) AGRICULTURE**

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A Project

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(Affiliated to Tamil Nadu Agricultural University)

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BACHELOR OF SCIENCE (Hons) AGRICULTURE

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*This is to certify that the Dissertation entitled “ **STUDIES ON INCIDENCE OF ROOT ROT DISEASE AS INFLUENCED BY DIFFERENT DATE OF SOWING IN GROUNDNUT (Arachis hypogea.,L)** is the bonafide record of work done under my supervision by A.YAZHINI (Reg.No:2017049055) and submitted to Pushkaram college of agricultural sciences (Affiliated to the TamilNadu Agricultural university) in Partial Fulfilment of the Requirements for the Award of **Degree of Bachelor of Science (Hons) Agriculture** during the Academic year 2020-2021. And no part of this dissertation is submitted for the award of any degree, diploma, fellowship or and that the work has not been published in part or full in any scientific or popular journals or magazines. This also certify that the thesis represents the independent work of the candidate.*

Date:19/08/2021

Place:Thiruvarangulam

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DECLARATION

The project entitled “**STUDIES ON INCIDENCE OF ROOT ROT DISEASE AS INFLUENCED BY DIFFERENT DATE OF SOWING IN GROUNDNUT(*Arachis hypogea*,L)**” has been carried out by me in the Department of Pathology, Pushkaram college of agricultural sciences, Thiruvarangulam, (Affiliated to TamilNadu Agricultural University) and the Dissertation forming the content of this particular project work is being submitted to TamilNadu Agricultural University, in Partial Fulfillment for the Award of Degree of Bachelor of Science (Hons) Agriculture. I further declare that this dissertation or any part of this has not been submitted elsewhere for any other degree, to the best of my knowledge.

Place: 19/08/2021

Date:Thiruvarangulam



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Signature of the Candidate

Extended Abstract

STUDIES IN INCIDENCE OF ROOT ROT DISEASE AS INFLUENCED BY DIFFERENT DATE OF SOWING IN GROUNDNUT (*Arachis hypogea*.,L)

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Abstract:

The objective of the research was to investigate the effect of different date of sowing on the development of root rot disease in groundnut. Incidence of rootrot disease as influenced by different date of sowing was studied in S.Kulavaipatty, Pudukkottai with five different sowing date and four replication. The crop was sown at 10th may, 20th may, 30th may, 10th june and 20th june. The highest disease incidence was recorded in 20th june (a late sown crop) due to some favorable weather for disease development. And the lowest number of disease development was recorded on 10th may(an early sown crop) due to unfavorable condition for disease development the early sown crop escaped from the disease attack. Among the total five sowing dates 10th june was very much suitable for the groundnut cultivar in pudukkottai. Date of sowing at 10th may is recorded as lowest disease incidence (6.87%) followed by date of sowing at 20th may (7.81%) and significantly superior to the rest of the treatments. And the highest disease incidence is recorded in the date of sowing at 20th june(9.68%). Highest disease incidence in the date of sowing at 20th june indicates the susceptible time for the root rot incidence in groundnut The early sowing of groundnut is less sensitive to the rootrot disease development. In this study it is concluded that early sowing of groundnut crop escapes from the damage of root rot disease. As a result, in order to effectively manage groundnut root rot disease in root rot prone areas, we need to seed the groundnut at an early stage.

KEY WORDS: Sowing date, Treatment, Replication, Percent Disease Incidence(PDI), Root rot disease development.

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STUDIES ON INCIDENCE OF DISEASES OF GROUNDNUT AS INFLUENCED BY DIFFERENT DATE OF SOWING(*Arachis hypogaea*.,L)

Introduction

Groundnut (*Arachis hypogaea* Linn.,) is one of the most important oilseed crops that occupy an area of 25.44 million hectares with production of 45.22 million tons in the world. In India, groundnut is major oilseed crop with area of 4.7 million hectares with a total production of 7.4 million tons having productivity of 1552 kg/ha. In Tamil nadu, groundnut cultivation covers an area about 3.42 lakh hectares and the production with 9.62 lakh tonnes with a productivity of 2813kg/ha(D.M.Hedge)

Groundnut, or peanut, is commonly called the poor man's nut. It is an important oilseed and food crop. This plant is native to South America and has never been found uncultivated. The botanical name for groundnut, *Arachis hypogaea* Linn., is derived from two Greek words, *Arachis* meaning a legume and *hypogaea* meaning below ground, referring to the formation of pods in the soil. And belongs to the family leguminaceae. Groundnut is an upright or prostrate annual plant. It is generally distributed in the tropical, sub-tropical and warm temperate zones. Groundnut contains on an average 40.1% fat, 25.3% protein and is fairly a rich source of calcium, iron and vitamin B complex like thiamine, riboflavin, niacin and vitamin A. It has multifarious usages. It is not only used as a major cooking medium for various food items but also utilized for manufacture of soap, cosmetics, shaving cream, lubricants, etc. In fact, it plays a pivotal role in oilseed economy of India. India is one of the largest producers of oilseeds in the world and occupy an important position in the Indian agricultural economy. It is estimated that nine oilseeds namely Groundnut, Rapeseed-Mustard, Soybean, Sunflower, Safflower, Sesame, Niger, Castor and Linseed accounted an area of 23.44 million hectares with the production of 25.14 million tonnes .

Groundnut is called as the 'king' of oilseeds. It is one of the most important food and cash crop of country. Being a valuable source of all the nutrients, it is a low priced commodity. Groundnut is also called as wonder nut and poor men's cashew nut. Almost every part of Groundnut has commercial value. Economically; Groundnut is a very valuable oil seed crop of India. Due to source of good quality edible oil, Groundnut oil is intensively used for cooking purposes both as

refined oil and vegetable oil (vanaspati ghee). Groundnut is widely used for table purpose as a snack. Groundnut is consumed as fresh, roasted, dried, boiled and in so many recipes. It is also used in the manufacturing of soaps, beauty creams, medical ointments and creams, paints, lubricants and many other industrial products. India exports Groundnut kernels, in shell, HPS Groundnut and oil cake. Groundnut haulms and leaves serve as a rich source of cattle feed and raw material for preparation of silage. Being a leguminous crop, groundnut also grows in crop rotation as it synthesizes atmospheric nitrogen and adds about 100-120 kg of nitrogen in the field per hectare per season. It maintains the fertility of soil and helps in reducing soil erosion. Groundnut oil cake is used as animal and poultry feed as well as an organic fertilizer. Groundnut shell is used in manufacturing industrial products like cardboard boxes etc. and also for fuel purpose.

Growth and yield of a crop depend on a number of factors. However, biotic stresses play the most important role. Among the biotic stresses, the role of diseases, insects and nematodes is important. The oilseed crops, particularly groundnut, are very sensitive to seed and soil-borne diseases caused by different plant pathogenic fungi like *Aspergillus niger*, *A. flavus*,

Macrophomina phaseolina, *Rhizoctonia solani* and *Sclerotium rolfsii* (Parvathi et al., 1985). Fungus survives in crop debris in the soil; disease emergence is favored by high soil temperatures which cause plants to be water stressed and more susceptible to disease; fungus can survive for prolonged periods in dry soils but is killed in wet soil. Some of the common diseases of groundnut like tikka disease of groundnut - Early leaf spot (*Cercopora arachidicola* (Sexual Stage: *Mycosphaerella arachidis*)), Late leaf spot (*Phaeoisariopsis personata*. (Syn: *Cercosporidium personatum*) (Sexual stage: *Mycosphaera v.rella berkeleyi*)). This disease's emergence is favored by high humidity and warm temperatures, spread of the disease is promoted by prolonged leaf wetness., rust (*Puccinia arachidis*) Peanut rust is highly specific to peanut; disease emergence and spread is favored by warm temperatures followed by leaf wetness. Collar rot or seedling blight or crown rot (*Aspergillus niger* and *A. pulverulentum*), Stem rot (*Sclerotium rolfsii*). Fungal wilt of groundnut (*Fusarium oxysporum*). Some of the common bacterial diseases are Bacterial wilt of groundnut (*Pseudomonas solanacearum*). And common viral disease of groundnut is groundnut or peanut bud necrosis caused by Peanut bud necrosis virus. PSV is transmitted by aphids; legumes such as white clover are the primary source of inoculum. And the nematode which affects the peanut is rootknot nematode

(*meloidogyne spp*). Galls can appear as quickly as a month prior to planting; nematodes prefer sandy soils and damage in areas of field or garden with this type of soil is most likely. The common diseases found in the reasearch area is leafspot, root rot complex, rust and the common bud necrosis virus.

These pathogens attack the crop alone or in combination and produces symptoms in complex form with collar rot, dry root rot and stem rot symptoms. This root rot complex pose a major threat causing considerable damage to crop during any stage of its growth. The rootrot caused by *Macrophomina phaseolina* also cause major economic loss to the crop, the typical symptoms of the disease may appear on roots, collar region, stem and branches of infected plants. The affected portions rotted, shriveled become darker or blakish in colour and plant collapsed and broke down from the rotted portion. Gradually affected plants showed general yellowing, drooping of leaves and ultimately death of plants before maturity. The systemic fungicide, Carbendazim was highly effective in inhibiting the growth of the fungus. Seed treatment with different fungicides and one biological agent, maximum germination percentage 66% were observed in seed treated with Carbendazim (12%) + Mancozeb (63%) followed by thiram (30%).(Rani, neha., BAU)

These diseases are treated or managed by different methods, integrated method plays a vital role in efficient management of diseases. Chemical methods involves in management is application of fungicides like Carbendazim, Mancozeb, chlorothalonil, hexaconozol or seed tratment with carbendazim or thiram. Some others protocols like crop rotation and field sanitation. Early sowing in the first fort night of June to avoid disease incidence. Strict plant quarantine regulations should be enforced to avoid the spread of rust on the pods or seeds to disease free areas. Destroy volunteer, self sown groundnut plants, reservoir hosts and debris to reduce the primary source of inoculums. Intercropping of pearl millet or sorghum with groundnut .

Date of sowing of crop also have remarkable effect on disease development in groundnut. Various scientists conducted field trials to study the effect of date of sowing on disease development and pod yield.

The present study was planned with objective to compare the effect of five sowing times on disease development and pod yield of one groundnut cultivars grown under irrigated conditions in Tamilnadu state particularly in Pudukkottai district. And to assess disease incidence and its severity in groundnut and tne impact of diseases on the growth and yield of groundnut.

REVIEW OF LITERATURE:

Richard Isa Bwala et al., in 2019 concluded that sowing date from 14th June to 29th June recorded significantly higher disease incidence compared with the sowing dates in May. So that early sowing of groundnut in May can be a better choice for managing a cercospora leafspot disease through a research which is titled in "Influence of variety and sowing date on incidence of cercospora leaf spots disease of groundnut (*Arachis hypogea* L.) in Nigeria."

In 2019, through a research on "effect of date of sowing on development of rootrot complex disease in groundnut(*Arachis hypogea* L.)" states that the highest number of yield contributing characters and pod yield was recorded in early sown crop(15th and 30th March sown crop 7.61% and 9.78% respectively). (Amritpal et al., 2019)

In Nigeria R.H.Booker, 1962 held a research on the title "effect of sowing date and spacing on rosette disease of groundnut in Northern Nigeria, with observations on the vector, *Aphis craccivora*" recorded that peanuts planted in June give more yield than those planted in July, and close spacing reduces the growth and spread of vector. So as the result shows that early sowing reduced the number of rosetted plants per acre and close spacing also reduce the percentage of plants infected.

A L. Siddharamaiah et al., 1980 shows that the disease incidence and severity of rust on groundnut sown on June was very less and thus helped the crop to escape from the damage of rust through a research "Effect of different dates of sowing of groundnut (*Arachis hypogea* L.) on rust development in Karnataka"

In Egypt, May 1st is the best sowing date and disease was 44.6% as compared to other dates, through a research Management of the root rot of peanut in the newly reclaimed land in EL-Behara governorate (Atta-Alla et al., 2004).

Late sowing of both semi spreading and bunch type varieties in month of June had resulted in declined yield and less growth as compared to timely sowing in the month of May (Sardana et al., 2008).

Similarly, five sowing dates at Pune were studied and results revealed that the sowing groundnut on 6th July significantly influenced various growth contributing characters and pod yield which was found significantly superior over all the sowing date treatments (Kanade et al., 2015).

Generally Groundnut is grown as a Kharif crop year after year. The yield of the cereal crop following groundnuts are usually increased by 25%(Dr.S.Sudhmani, Alagappa university, Karaikudi).

Seed quality traits are influenced by different date of sowing and harvesting. The seeds of crop harvested at 135 DAS produced seeds of better quality than 120-150DAS (Push sharma et al., 2013)

More than 53 pathogens including viruses have been reported to affect groundnut and have an economic loss (Subramaniyan et al., 1985)

Dry root rot(*Macrophomina phaseolina*) is sporadic in occurrence and is particularly serious in Rajasthan, Uttar pradesh, Andra pradesh, Maharashtra and Tamil nadu. The pathogen is sporadic and soil dweller (vinodkumar et al., Directorate of groundnut research, jungadh, Gujarat).

The incidence and severity of diseases varies between localities, season and different date of sowing and there can be both short and long term fluctuations in their relative proportions(mc donald et al., 1985).

Stem rot caused by *Sclerotium rolfsii* is becoming severe disease of groundnut in India. It caused 80% of crop loss in Ground nut. And stem rot is one of the major threats in India with an incidence of 59%(Mehan et al., 1994).

In seed and seedling diseases collar rot, stem rot, dry root rot have been recognized as economically important diseases. These diseases have severe seedling mortality resulting in patchy crop stand mostly in sandyloam and reduces in 25-50% of yield (chohan, 1974 ghewande,1985).

The bio-control agent *Trichoderma harzianum* gives a significant increase in yield (39.17Q/ha) and lowest rootrot incidence (14.03%) (pratibha sharma et al., 2012, IARI, India).

The number of immigrant aetia were significantly greater on late-sown or open-spaced than on early-sown or close spaced groundnuts, and were correlated with number of randomly distributed primary rosette infections(J.A.K.Farrell, Cambridge university, 2009)

Under a research held by Shakil ahmed, no groundnut genotypes was completely resistant to rootrot. In groundnut genotypes 02KCG020, disease incidence was minimum of 10% with 100% plant survival. The groundnut variety BARI 2000 and golden was intermediate in resistance to rootrot with disease incidence 19% and plant mortality 11% and 8% respectively.

Menrado conducted a research in Effect of planting date on disease occurrence and yield of three peanut varieties concluded that regardless of the variety, the highest disease incidence of cercospora leaf spot(CLS) and rust was obtained in the month of October while the lowest infection of CLS and rust was obtained in the month of December.

MATERIALS AND METHODS

Details of experiment

Table.1 Details of experiment

Location	S.Kulavaipatty, Pudukkottai (dist)
Year	2021
Design	Randomized blockdesign
Replications	4(four)
Name of variety	GG 6
Treatment	5 (five)

Details of treatment

Table.2 Details of treatment

TREATMENT NO.	DATE OF SOWING
1.	10/05/2021
2.	20/05/2021
3.	30/05/2021
4.	10/06/2021
5.	20/06/2021

Selection of field

Five different fields are selected either at different location or at same location in order to get five different sowing dates (i.e., on 10th may, 20th may, 30th may, 10th june and 20th june). The selected field of each sowing date is divided into four plots which is maintained as a replication with the plot size of 3x5m² and with the plant population of 500 plants/plot. Spacing between the plants is maintained as 30x10cm.

.Symptomology:

Root rot in groundnut is caused by two different fungus which is *Macrophomina phaseolina* and *Aspergillus niger*.

Dry root rot caused by *Macrophomina phaseolina* has the following symptoms of water soaked necrotic lesions that girdles the stem just above the root level and wilting follows. The tap root turns back and later roots and shreds. Kernels turn black with abundant sclerotia on inner wall of the shell and surface of the testa.

Collar rot caused by *Aspergillus niger* have the diagnostic symptoms like the collar region of the affected plants becomes shredded and becomes dark brown covered by mycelial growth and spores.

Observation

Observation will be done in four plots /field and in each plot 20 sample plant will be selected and then diseases incidence of the field are recorded. Disease severity is assessed by percent disease incidence. The observation are taken in a weekly interval for two months. Yield will be assessed different date of sowing and correlation will be done. From that the results are concluded.

Calculation

The percent disease incidence (PI) is calculated by the ratio of number of infected plants to the total number of plants observed multiplied by 100.

$$\text{Per cent diseases incidence (PI)} = \frac{\text{Number of infected plants}}{\text{Total number of plant observed}} \times 100$$

Statistical analysis

The Experiment is carried out by Randomized Block Design (RBD) through an ANOVA table in order to get a more efficient and accurate result. In this method flexibility is also high and thus number of treatments and any number of replications can be used.

RESULT AND DISCUSSION:

The data on effect of sowing dates on the percent disease incidence were collected from the experimental field located in kulavaipatty and the data were pooled together for the comparison. From Table no. 3 to Table no. 12.

7DAS						
S.NO	Treatment	Per cent disease incidence (%)				Mean (%)
	Different date of sowing	R1	R2	R3	R4	
1.	T1	0.00	0.00	0.00	0.00	0.00
2.	T2	0.00	0.00	0.00	0.00	0.00
3.	T3	0.00	0.00	0.00	0.00	0.00
4.	T4	0.00	0.00	0.00	0.00	0.00
5.	T5	0.00	0.00	0.00	0.00	0.00

Table no.3 First week observation of root rot disease incidence

14 DAS						
S.NO	Treatment	Per cent disease incidence (%)				Mean (%)
	Different date of sowing	R1	R2	R3	R4	
1.	T1	0.00	0.00	0.00	0.00	0.00
2.	T2	0.00	0.00	0.00	0.00	0.00
3.	T3	0.00	0.00	0.00	0.00	0.00
4.	T4	0.00	0.00	0.00	0.00	0.00
5.	T5	0.00	0.00	0.00	0.00	0.00

Table no.4 Second week observation of root rot disease incidence

21DAS						
S.NO	Treatment	Per cent disease incidence (%)				Mean (%)
	Different date of sowing	R1	R2	R3	R4	
1.	T1	0.00	5.00	0.00	5.00	2.50
2.	T2	0.00	5.00	5.00	10.00	5.00
3.	T3	5.00	10.00	5.00	10.00	7.50
4.	T4	10.00	5.00	10.00	5.00	7.50
5.	T5	5.00	5.00	10.00	10.00	7.50

Table no.5 Third week observation of root rot disease incience

21DAS						
S.NO	Treatment	Per cent disease incidence (%)				Mean (%)
	Different date of sowing	R1	R2	R3	R4	
1.	T1	0.00	5.00	0.00	5.00	2.50
2.	T2	0.00	5.00	5.00	10.00	5.00
3.	T3	5.00	10.00	5.00	10.00	7.50
4.	T4	10.00	5.00	10.00	5.00	7.50
5.	T5	5.00	5.00	10.00	10.00	7.50

Table no.6 Fourth week observation of root rot disease incidence

28DAS						
S.NO	Treatment	Per cent disease incidence (%)				Mean (%)
	Different date of sowing	R1	R2	R3	R4	
1.	T1	0.00	10.00	5.00	10.00	6.25
2.	T2	5.00	10.00	15.00	5.00	8.75
3.	T3	5.00	10.00	10.00	10.00	8.75
4.	T4	5.00	5.00	15.00	5.00	7.50
5.	T5	5.00	10.00	15.00	15.00	11.25

Table no.7 Fifth week observation of root rot disease incidence

35DAS						
S.NO	Treatment	Per cent disease incidence (%)				Mean (%)
	Different date of sowing	R1	R2	R3	R4	
1.	T1	5.00	15.00	10.00	10.00	10.00
2.	T2	10.00	15.00	5.00	10.00	10.00
3.	T3	10.00	15.00	10.00	10.00	11.25
4.	T4	15.00	10.00	10.00	5.00	10.00
5.	T5	10.00	15.00	15.00	15.00	13.75

Table no.8 Sixth week observation of root rot disease incidence

42DAS						
S.NO	Treatment	Per cent disease incidence (%)				Mean (%)
	Different date of sowing	R1	R2	R3	R4	
1.	T1	10.00	15.00	5.00	10.00	10.00
2.	T2	10.00	15.00	10.00	10.00	11.25
3.	T3	5.00	15.00	15.00	5.00	10.00
4.	T4	20.00	15.00	5.00	10.00	12.50
5.	T5	5.00	20.00	15.00	15.00	13.75

Table no.9 seventh week observation of root rot disease incidence

49DAS						
S.NO	Treatment	Per cent disease incidence (%)				Mean (%)
	Different date of sowing	R1	R2	R3	R4	
1.	T1	5.00	20.00	15.00	10.00	12.5
2.	T2	15.00	15.00	10.00	10.00	12.5
3.	T3	20.00	15.00	15.00	10.00	15.00
4.	T4	20.00	15.00	10.00	10.00	13.75
5.	T5	15.00	5.00	20.00	20.00	15.00

Table no.10 Eighth week observation of root rot disease incidence

	DIFF. DATE OF SOWING	PERCENT DISEASE INCIDENCE%				MEAN%
S.NO	TREATMENT	R1	R2	R3	R4	
1	T1 (10/05/2021)	3.75	10	6.25	7.5	6.875
2	T2 (20/05/2021)	7.5	8.125	8.125	7.5	7.8125
3	T3 (30/05/2021)	8.125	9.375	8.75	6.25	8.125
4	T4 (10/06/2021)	11.25	8.75	7.5	6.25	8.4375
5	T5 (20/06/2021)	7.5	8.75	11.25	11.25	9.6875

Table no. 11 Final concluded research value of percent disease incidence for cv calculation

RESULT:

DATE OF SOWING	DISEASE INCIDENCE
10 th may	6.875
20 th may	7.8125
30 th may	8.125
10 th june	8.4375
20 th june	9.6875
SEd	0.14
CD@5%	0.36

Table no.12 Disease incidence at different date of sowing

On close examination of the data on percent disease incidence showed in Table no.12 revealed that there is an influence of incidence of root rot disease in groundnut at different date of sowing.

The level of significance($P < 0.005$) is 0.36. There was a non-significant difference in early sown groundnut. However, Percent disease incidence(PDI) ranges from 0-9.68% from the first date to last date of sowing mentioned in the Table no.12. The PDI is recorded as 0-7% in 10th may, 0-7.8% in 20th may , 0-8% in 30th may ,0-8.5% in 10th june and 0-9.6% in 20th june.

Date of sowing at 10th may is recorded as lowest disease incidence (6.87%) followed by date of sowing at 20th may (7.81%) and significantly superior to the rest of the treatments. And the highest disease incidence is recorded in the date of sowing at 20th june(9.68%).

Highest disease incidence in the date of sowing at 20th june indicates the susceptible time for the root rot incidence in groundnut.

DISCUSSION:

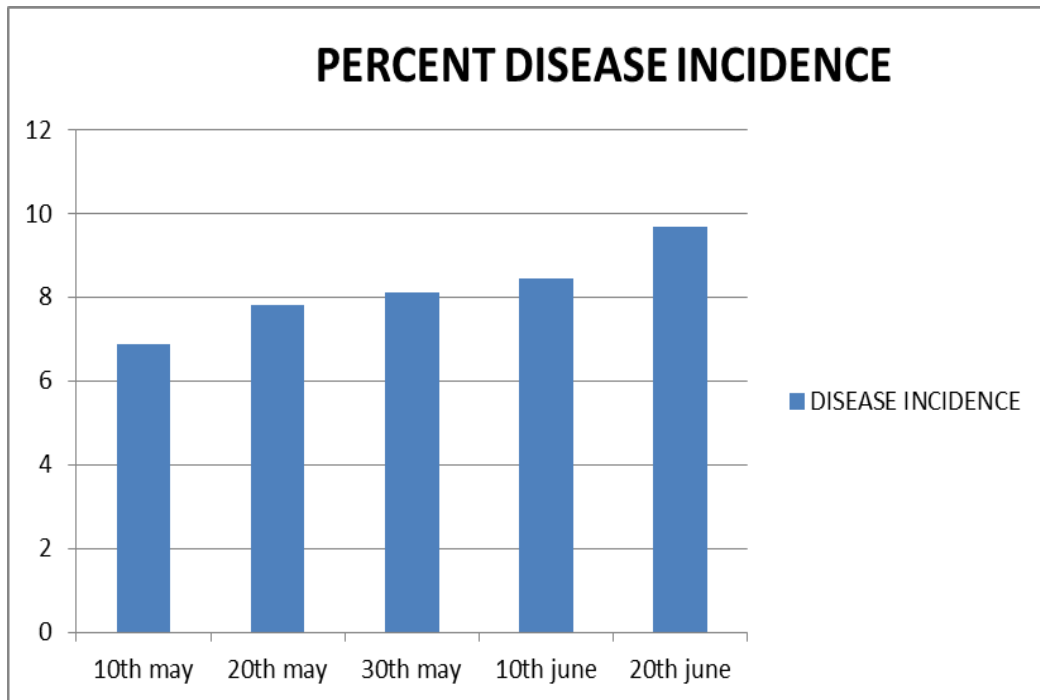


FIG.1 Percent disease incidence of groundnut variety at different date of sowing

The experimental findings shows clearly that there is an impact of date of sowing on groundnut root rot disease incidence. In this present study, percent disease incidence(PDI) increased linearly with different date of sowing. Minimum PDI is recorded in 10th may of sowing and maximum value recorded at 20th june.

So that proper time for sowing ground nut in rabi season is to be as early sown crop inorder to escape the plant from the incidence of groundnut root rot disease.

The findings of present invsestigation is in conformity with the findings of Amritpal et al .,(2019) in Punjab who reported that least percentage of percent disease incidence of groundnut in early sown groundnut crop compared to all other dates of sowing. And the results also justify the findings of Kumar M and kudada (2018) who reported that early sowing of french beans escape from the *Rizoctonia* root rot incidence. On the same way, the research of the Mushrif et al., shows that early sown groundnut crop in Bangalore escapes from the great damage of a fungal disease (Tikka disease of groundnut).

SUMMARY AND CONCLUSION:

SUMMARY:

The percent disease incidence was recorded from five different sowing dates of a variety and then the whole data was pooled. The pooled data shows that minimum disease incidence of 6.8% was recorded on 10th may (Table 12). However the maximum disease incidence of 9.68% was observed in 20th june sown crop (Table 12) because the agrometeorological conditions were congenial for disease development. Results showed that early sowing of groundnut escaped the disease attack and there was a continuous increase in the disease incidence with the delay in the date of sowing. Low temperature during germination adversely affects the groundnut variety, so if it is early sown in summer time the crop might escape from the low temperature germination sequence.

CONCLUSION:

In this study it is concluded that early sowing of groundnut crop escapes from the damage of root rot disease. As a result, in order to effectively manage groundnut root rot disease in root rot prone areas, we need to seed the groundnut at an early stage.

PLATES:



PLATE No. 1 Field of treatment-1 with the sowing date of 10th may



PLATE No. 2 Field of treatment-2 with the sowing date of 20th june



PLATE No. 3 Field of treatment-3 with the sowing date of 30th june



PLATE No. 4 Field of treatment-4 with the sowing date of 10th may



PLATE No. 5 Field of treatment-5 with the sowing date of 20th june



PLATE NO.6 Dry root rot occurrence in groundnut research field



PLATE NO.7 Collar rot occurrence in groundnut research field.

REFERENCE:

- Amritpal singh sekhon, P.S.Sandhu, Pankraj sharma, K.K.Sharma and Rakesh Belludi,2019. Effect of date of sowing on development of root rot complex disease in groundnut (*Arachis hypogea* L.). Department of plant pathology, Punjab agriculture university, Ludhiana, Punjab, India.
- Atta-Alla S.L, I.A sharma, A.E.Korany, M.Asheikh and M.F.Nawam,2004. Management of the root rot of peanut in the newly reclaimed land in EL-Behara governorate,Egypt. Journal of agricultural and environmental sciences. Alex university., Egypt.
- Baskey.S, Khalko.S, Hembram.S, Sharma.B.R and S.Alli, 2020. Survey for the incidence of stem rot of groundnut in North Bengal districts of West bengal. Regional research station (hill station), West bengal, India, 734301.
- Booker.R.H,1962. Effect of sowing date and spacing on rosette disease of groundnut in Northern Nigeria, with observations on the vector, *Aphis craccivora*. Institute of agricultural research, Ahmadu bello university, Northern nigeria.52,125-131.
- Brian S.Jordan, Albert K.Culbreath, Timothy B. Brenneman, Robert C.Kemerait Jr., and Katherine L. Stevenson,2019. Effect of planting date and peanut cultivar on epidemics of late leaf spot in Georgia. Department of plant pathology, The university of georgia, Tifton, GA 31793-5766.
- Divyarani.V, Harisudhini P.Narayan reddy , Uma devi.G and K.Vijaykrishna kumar, 2013. Survey of the assesment of incidence of stem rot and collar rot diseases of groundnut in major groundnut growing areas of Andhra pradesh and Telangana sites. Professor Jayashankar Telangana state agricultural university,Hyderabad,TG,India
- Farrell.J.A.K, 2009. Effects of groundnut sowing date and plant spacing on rosette virus disease in malawi. Bulletin of entomological research, cambridge university, volume66,issue 1,pp.159-171.
- Hedge.D.M, Importance of groundnut in Indian economy, EX. Director ICAR Indian institute of oil seeds research, Hyderabad.
- Kanade.S.G, Shaikh.A.A and J.Jadhav, 2015. Effect of sowing dates in groundnut(*Arachis hypogea* L.) on growth, yield attributing characters and yield. Zonal agricultural research station, Solapur, India. Corpus ID:131855748.
- Kumar.M and Kudada.N, 2018. Effect of sowing dates and weather conditions on *Rhizoctonia* root rot disease incidence and green pod yield of french bean. Department of plant pathology, Bihar agricultural university, Bihar, India.

Mehan.V.K.M, C.D.Mayee and D.McDonald,1994. Management of *Sclerotium rolfsii*- caused stem rot and pod rots of groundnut—a critical review. International journal of pest management, 40:4, 313-320.

Menrado Gatan,2020. Effect of planting date on disease occurrence and yield of three peanut varieties. Pampanga state agricultural university, university of Magalang, Philippines.

Moradia.A.M and R.R.Khandar,2011. Loss of yield of groundnut (*Arachis hypogea* L.) due to dry root rot(*Macrophomina phaseolina*) and their management under *in vitro* condition. International journal of agricultural science., 7(2):282-285.

Mushrif.S.K, Manju.M.J, Shankrappa.T.H and Nagaraju,2017. Studies on tikka disease: Effect of sowing dates on the biochemical parameters of groundnut. Department of plant pathology and agricultural microbiology, University of horticultural sciences, Bagalkot-587104, India.

Palaiyah.P, Narendrappa.T, Mallesh.S.B and C.R.Jahir pasha,2019. Survey of collar rot, stem rot and dry root rot disease incidence of groundnut in parts of karnataka,India. ICAR KVK, Kalaburgi, India: 2080-2084.

Pratibha sharma, Mahesh kumar saini, Swati deep and Vignesh kumar,2012. Biological control of groundnut rootrot in farmers field. Journal of agricultural science, ISSN(online) : 1916-9760.

Push sharma, Virender sardana and Sukhvinder singh kandhola,2013. Effect of sowing dates and harvesting dates on germination and seedling vigor of groundnut(*Arachis hypogea*) cultivars. Research journal of seed science,6: 15.

Richard Isa Bwala, Chigoziri Ekhumelo and Dauda Zacharia. Incidence of cercospora leaf spot disease of groundnut (*Arachis hypogea* L.) as influenced by sowing date in Makurdi, Benue state of Nigeria. Department of crop protection, Faculty of agriculture, P.M.B.1069 university of Maiduguri,Nigeria. ISSN: 0719-3726.

Shakil ahmad, Noor zaman and Salik nawazkhan,2012. Response of groundnut genotypes against rootrot disease in district Manwali. Institute of agricultural sciences, university of punjab, lahore, pakistan. Pak.J.Bot.,44:383-386.

Siddaramaiah.A.L.,Desai.S.A, Hedge.R.K and H.Jayaramaiah, 1980. Effect of different dates of sowing of groundnut on rust development in Karnataka.Department of plant pathology, College of agriculture, Darwar, Karnataka.No. 3 pp 389-392(1980).

Utpal dey, Dhutraaj.D.N, Kamble.H.N, Suryawansi.A.P and Anup das, 2015. Influence of time of sowing and groundnut varieties on the incidence and severity of late leaf spot(*Phaeoisariopsis personata*) of groundnut. Department of pathology,Vasantro Naik Marathwada Krishi Vidyapeeth, Parbhani. 431402.

Vinod kumar and P.P.Thirumalaisamy,2016. Diseases of field crops and their management. Indian phytopathological society, today and tomorrow's printers and publishers, New Delhi, 445-494.

Virender Sardhana, Kandhola SS, 2007. Productivity of semi-spreading and bunch type varieties of groundnut as influenced by sowing dates. Dep.of plant breeding,genetics and Biotechnology, PAU,Ludhiana 141 004, Punjab, India.