Research Article

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Evaluation Of Different Concentrations Of Mancob M For The Control Of Cercospora Leaf Spot (*Cercospora Sesami* Zimm) On Some Sesame Varieties In Yola, Nigeria

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Abstract

Diseases pose serious constraints to Sesame production in producing areas. Cercospora leaf spot (Cercospora sesami Zimm) has been identified as one of the most prevalent diseases which is to be controlled by Mancob M fungicide. The field experiment was carried out using a Randomized Complete Block Design and was replicated three times on a plot size of 4m x 5m with four sesame varieties and three Mancob-M fungicide levels (0, 2 and 4g) to give a total of twelve treatments. The laboratory experiment involved isolation of the pathogens from diseased leaves with symptoms of Cercospora leaf spot which was identified as Cercospora sesami. Data collected includes growth and disease parameters. The result revealed that 4g Mancob M recorded the lowest mean value for disease incidence and severity at 8WAS which was 90.30% and 35.60% respectively, while the control (0g) recorded the highest mean value for disease incidence and severity at 90.30% and 59.80% respectively. Ex-sudan recorded the lowest value of 720 kg/ha while NCRIBEN 03 recorded the highest yield of 834 kg/ha-1. For the concentrations, 2g recorded a higher yield of 843 kg/ha-1 followed by 0g which recorded 765 kg/ha-1. Variety E8 has a higher resistance to the disease while NCRIBEN 03 tends to be more susceptible but gave a higher yield. It therefore implies that variety E8 which showed higher resistance to the disease can be merged with NCRIBEN 03 (through hybridization) to produce a much better variety.

Introduction

Sesame (*Sesamun indicum L.*) commonly referred to as Beniseed, is one of the most cultivated oil seed crop of the world. It is an annual plant that belongs to the family of Pedaliaceae. It is considered to be the oldest of the oil seed plants and has been under cultivation in Asia for over 5,000 years [1]. It is said to have originated in Africa, from where it was taken on early date to India. Although the origin of Sesame has been a major subject of discussion with the African or the Indian subcontinent as the two suggestions. Bedigian (1981) argues that owing to the wide genetic diversity in Africa, it is reasonable to assume that Africa is the primary center of origin [2].

Diseases also pose serious constraints to Sesame production in producing areas. Among these, cercospora leaf spot (*Cercospora sesami*) has been identified as one of the most preventive diseases. The disease has been reported from all the Sesame growing areas throughout the world. Cercospora leaf spot enormously contributed to the reduction in the yield of Sesame [3]. Cercospora leaf spot (CLS) disease induced by *Cercospora sesami*, is reported as the most prevalent in Nigeria and other parts of Africa of which there is no satisfactory control method being evolved yet [4].

The attempt by man to improve crop yield in order to produce enough food for consumption in the face of the increasing population is a decision in the right direction although it is being hampered by many constraints. The most important and interesting problem encountered by scientist in this attempts, is how to drastically reduce or wholly prevent plant diseases. Even though, there is increasing armoury of weapons such as resistant varieties and chemicals to control the diseases, the control has become a continual battle because the attack on the crop by these enemies occur when least expected [5]. This research work was aimed at identifying the prevalence of Cercospora leaf spot disease of sesame, examining the disease severity caused by Cercospora leaf spot (CLS) on four sesame varieties and evaluating the efficacy of different concentrations of Mancob- M on the control of Cercospora leaf spot disease of sesame.

Materials and Method

Study Area

This study was carried out at the Teaching and Research Farm of

the Department of Crop Production and Horticulture, Modibbo Adama University of Technology Yola Adamawa State during the raining season of 2016. The study consisted of two (2) experiments. The first experiment was carried out on the farm and the second experiment, was carried out in the Laboratory of the Plant Science Department of the School of Pure and Applied Sciences, Modibbo Adama University of Technology, Yola, Adamawa state. Yola, lies between latitude 8oN and 11°N and longitude 11.5° E and 13.5° E (Adamawa State Government Diary, 2008). Adebayo, (1999) reported that the state is located at an altitude of 185.9 m above sea level and lies within the Northern Guinea Savannah zone of Nigeria.

Experiment I: Field Experiment

Experimental design and layout

The field experiment was carried out using a Randomized Complete Block Design and was replicated three times on a plot size of 4 m x 5 m using four (4) sesame varieties and three (3) Mancob-M fungicide levels (0g, 2g and 4g) to give a total of sixteen (16) treatments. The laboratory experiment was to isolate the pathogens responsible for cercospora leaf spot from diseased leaves.

Collection of plant materials and preparation of growth media

Diseased plant materials *on sesame leaves* were detached and taken to the plant science laboratory where it was rinsed and washed with 10 % sodium hypochlorite (NaOCl), for further microscopic and macroscopic observation and identification.

Source of sesame seeds

The sesame seeds for this study were; E8, Ex-Sudan, NCRIBEN 03 and NCRIBEN 02 (Table 1) which were sourced from the National Cereals Research Institute, Badeggi, Niger State through the Agricultural Services Department of the State Ministry of Agriculture Headquarters, Yola.

Agronomic practices

Four sprayings of fungicide Mancob-M (Mancozeb 64% + Metalaxyl 8% a systemic, preventative and protective fungicide) was done on the control plots. The first was done at 3 weeks after sowing (WAS) and subsequently weekly with the fungicide at the rate of 0g, 2g and 4g per 3500ml of water respectively per plot. The recommended rate is 0.05% per litre.

The plots were kept weed free by weeding at 3 and 6 WAS as seen in plates I and II and insects were controlled by applying Smash Super (Cypermethrin 100 EC) at the rate of 30 ml l^{-1} of water weekly which commenced at 3 WAS.

The beni seed plants received 60g $plot^{-1}$ of NPK 15:15:15 in two split doses with the first dose applied at 3 WAS and the second dose at 6 WAS, which conforms with the fertilizer requirement of the crop.

Experiment II: Laboratory Experiment

Isolation of fungal pathogens

Diseased leaves of sesame with the symptom of *fungal infection* as seen in plate 4 were collected from the experimental plots during the course of the experiment. A small piece from the advancing margin of a lesion on diseased leaf was cut with a sterile pair of scissors after sterilizing with 10% sodium hypochlorite [6]. The tissues were thoroughly washed in several changes of sterile distilled water and placed aseptically into 9 cm diameter Petri dishes containing 20 ml of molten Potato Dextrose Agar (PDA). The medium was impregnated with streptomycin, and cultured for 7 days at room temperature (28-30oC) in a sterile fume cupboard. Distinct colonies present on the plates were selected, purified by repeated culturing and maintained on PDA slants. The fungus isolated was kept in an agar slant.

Table 1: Agronomic Characteristics of Sesame Varieties used for the Study

Variety	Days to maturity	Seed colour	Seed size	Oil content (%)	Potential yield (kg/ha)
NCRIBEN 02	102-115 (medium)	White	3mm	45	1000
NCRIBEN 03	102-115 (medium)	Light brown	3mm	45	750
Ex-Sudan	90(early)	White	3.6mm	50	1200
E8	90 (early)	Light brown	3.6mm	50	1000

Source: NCRI, 2002

Preparation of growth medium and inoculation

About 39 g of Potato Dextrose Agar powder (Sigma GMBH) was dissolved in 1000 ml of distilled water and the content was stirred and autoclaved for 25 minutes at 115°C. The medium was allowed to cool down and was aseptically poured into 500 ml flat bottom flask for later use. Thereafter 20 ml of molten Potato Dextrose Agar (PDA) at 45-50°C was poured aseptically onto a Petri dish and allowed to solidify, before diseased leaf was introduced into the middle of the agar and kept in a sterilized fume cupboard at room temperature of 28-30°C. The pathogen isolated was purified and kept for proof of Koch's postulate.

Data collected

During the course of the study, the following parameters were taken to enable statistical analysis and for drawing inference, these are;

Growth Parameters

Plant establishment was determined by counting the number of plants that have survived after planting at 2 weeks after sowing (WAS). Plant height in millimetres was determined at 11 WAS by measuring from the base of the plant to tip using a meter rule in centimeters. Number of branches were assessed by counting the number of branches per tagged plant within a plot for each variety. Days to 95% flowering was carried out by monitoring and recording the time in days from planting to the time 95% of the sesame plants produced fruits. Number of capsules from each plot was counted and expressed as number of capsules per variety. Total yield was determined by weighing the seed harvested per plot. Seed yield per hectare was determined as follows:

$$\text{Seed yield (kg/ha}^{-1}\text{)} = \frac{\text{Seed weight (kg) of net plot}}{\text{Harvested net plot area (m}^2\text{)}} \text{ X } 10000\text{m}^2$$

Disease Parameters

Disease incidence was determined by counting the number of tagged plants that exhibited symptoms of Cercospora leaf spot using the formula below:

$$\text{Disease Incidence} = \frac{\text{Total number of disease plants}}{\text{Total number of plants sampled}} \text{ X100}$$

Assessment of Cercospora leaf spot on the sesame plants as seen in plate 3 was carried out using the scale of Enikuomehin et al. (2002) on a scale of 1-7 as shown below:

Disease score for Cercospora leaf spot disease of sesame

Scale	Disease severity (%)	Resistant Category	Rating	Leaf spot characteristics
1	0 – 14	Immune (I)	No disease	No trace of infection
2	14.1 – 29	Highly resistant (HR)	Hypersensitivity	Hypersensitive spot on lower leaves only
3	29.1 – 43	Resistant (R)	Trace infection	Small lesion on lower leaves only
4	43.1 – 57	Moderately resistant (MR)	Slight infection	Small lesions on lower and upper leaves and stem
5	57.1 – 71	Moderately susceptible (MS)	Moderate infection	Advanced lesions on upper and lower leaves with or without new infection on stem and petiole
6	71.1 86	Susceptible (S)	Severe infection	Advanced lesions on upper and lower leaves, flower, buds, stems and petiole and slight infection of pod
7	86.1 100	Highly susceptible (HS)	Very severe infection	

Source: Enikuomehin et al. (2002)

$$\text{Disease severity} = \frac{\text{Sum of all individual ratings}}{\text{Total Number of sampled plants} \times \text{Maximum score of the scale}} \times 100$$

The disease was assessed by placing two permanent quadrat randomly per plot [7]. The number of plants and number of infected in the quadrant were counted and the percentage disease incidence was worked out. Disease severity was estimated by assessing 5 plants randomly tagged per plot and the overall score according to percentage area covered using scale of Enikuomehin et al. (2002) [7].

Data Analysis

Data collected were subjected to analysis of variance (ANOVA) for a randomized complete block design using SAS (1999) statistical package. The treatment means that are significantly different were separated using Least significant difference (LSD) at P>0.05

Table 2: Effects of different Concentrations of Mancob M and Variety on Plant establishment, Plant height, Number of branches and Days to 95% flowering

Varieties	Establishment	Plant height 8	No. of branches	Days to 95% flower.
E8 (V)	41.90	143.60	8.78	56.70
Ex-sudan	53.10	138.30	8.11	56.70
NCRIBEN 03	59.10	137.20	7.11	57.00
NCRIBEN 02	53.60	145.10	7	58.70
P< F	0.339	0.493	0.414	0.028
LSD	21.34	14.22	2.779	0.153
Concentration	(C)			
0g	50.6	137.4	7.67	56.70
2g	53.4	145.4	8	56.70
4g	51.8	140.4	7.58	57.00
P< F	0.911	0.617	0.436	0.475
LSD	13.92	17.24	0.707	0.653
V&C	NS	*	NS	NS

Results

Experiment 1: Field Experiment

Effect of different concentrations of Mancob M and varieties on plant establishment, plant height, number of branches and days to 95% flowering

Results of effect of Mancob M and varieties on plant establishment, plant height, number of branches and Days to 95% flowering are presented in Table 2. Results showed no significant difference was observed among the varieties on plant establishment and Days to 95% flowering. But there was a slight significant ($P \leq 0.05$) difference among the varieties on number of branches. Variety E8 possessed the higher number of branches at 8.78 compared to NCRIBEN 02 which recorded the lowest number at 7.00.

Slightly significant interaction was observed between the sesame varieties and different concentrations of Mancob M on number of branches (Table 3). Variety E8 recorded 9.67 at 0g, 9.33 at 2g and 7.33 at 4g in a decending trend while NCRIBEN 02 recorded a slightly lower value in an accending trend which is 6.33 at 0g, 7.07 at 2g and 7.67 at 4g respectively.

Table 3: Interaction between Sesame varieties and different Concentrations of Mancob M for Number of branches at 8 WAS

Concentration of Mancob M (g/350ml)			
Treatment	0g	2g	4g
E8	9.67	9.33	7.33
Ex sudan	7.33	9	8
NCRBEN 03	7.33	6.67	7.33
NCRIBEN 02	6.33	7.07	7.67
P< F	0.012		
LSD	2.854		

Effect of different concentrations of Mancob M and variety on the incidence of Cercospora leaf spot of sesame at 5 – 8 WAS

Effect of Concentration of Mancob M and varieties on disease incidence of Cercospora leaf spot of sesame at different sampling

periods is presented in Fig. 1 and 2. The results revealed no significant difference ($P > 0.05$) among the varieties all through the sampling periods. The result further revealed that among the different concentrations of Mancob M, there was highly significant difference ($P < 0.01$) in disease incidence at 5 WAS. Concentration 0g recorded the highest incidence of 38.9% followed by 2g with 36.1%. These particular concentrations differed significantly from concentration 4g which recorded the least value of 23.6%.

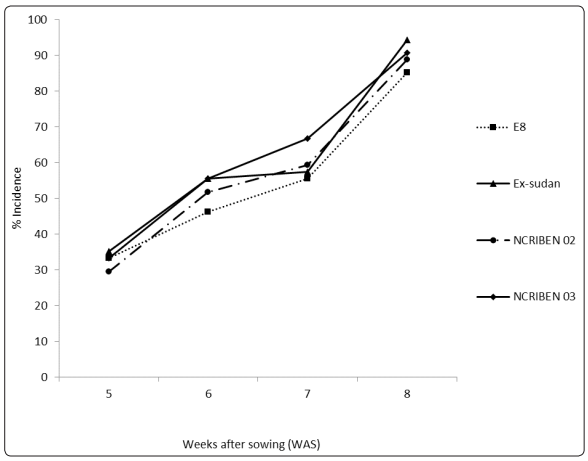

Figure 1: Effect of disease incidence on different varieties of cercospora leaf spot of sesame at 5-8 weeks after sowing. (WAS)

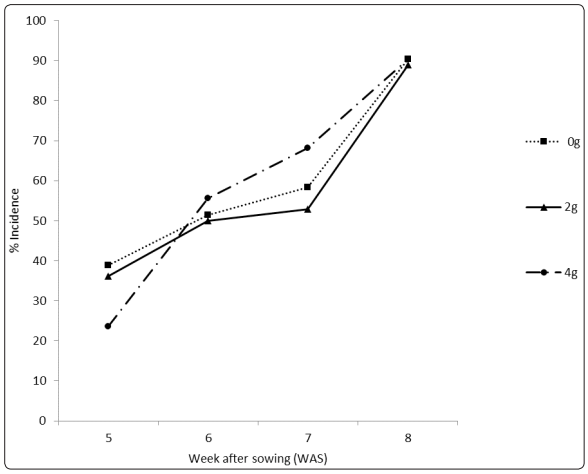

Figure 2: Effect of different Concentrations of Mancob M on Disease incidence of Cercospora leaf spot of sesame at 5-8 weeks after sowing. (WAS)

Results at 6 and 8 WAS revealed no significant difference ($P > 0.05$) among concentrations. But at 7 WAS, significant differences were observed at $P < 0.05$ among the concentrations. Concentration 4g recorded the highest with 68.1% followed by 0g which had 58.3. The lowest incidence was recorded from concentration 2g with 52.8%.

Effect of different concentrations of Mancob M and varieties on disease severity of Cercospora leaf spot at 5-8 WAS

Result on the Effect of different concentrations of Mancob M and varieties on severity of Cercospora leaf spot at 5-8 WAS is presented in Figures 3 and 4. There were highly significant differences ($P \leq 0.05$) among the sesame varieties all throughout the sampling periods except at 5 and 6 weeks after sowing (WAS). At 7 WAS, NCRIBEN 03 recorded the highest disease severity of 31.71% followed by Ex–sudan with 30.13%. These two varieties of sesame differed significantly from the rest of the varieties which had 26.17% and 29.06% from E8 and NCRIBEN 02 respectively.

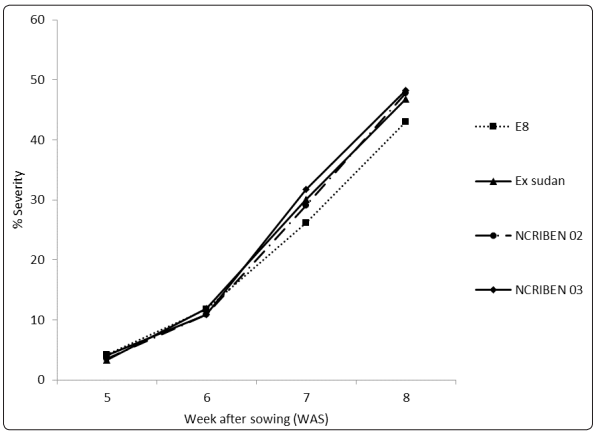

Figure 3: Effect of variety on Disease severity of cercospora leaf spot of sesame at 5 - 8 weeks after sowing. (WAS)

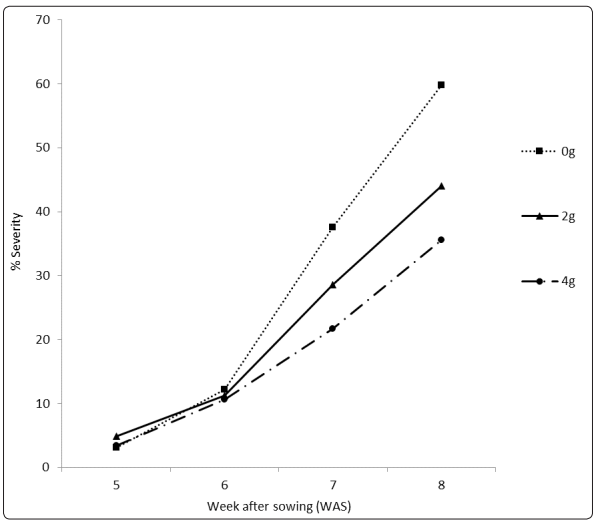

Figure 4: Effect of different Concentrations of Mancob M on Disease severity of Cercospora leaf spot of sesame at 5-8 Weeks after sowing (WAS)

Results from Table 4 showed significant interactions between sesame varieties and different levels of Mancob M concentration. At 7WAS, NCRIBEN 02 recorded the highest disease severity of 66. 70%, 61.1% and 72.2% at 0g, 2g and 4g respectively. Variety E8 recorded significantly lower values of 44.4%, 55% and m66.7% at 0g, 2g and 4g respectively. At 8WAS, NCRIBEN 03 recorded 61.84% at0g, 44. 28% at 2g and 37.34% at 4g. Similarly, variety E8 recorded the lowest disease severity of 56%, 39.40%, and 33.64% at 0g, 2g and 4g respectively.

Table 4: Interaction between Sesame Varieties and different Concentrations of Mancob M on Disease severity at 7 & 8 WAS

Concentration Of Mancob M at:						
Variety	**7 WAS**			**8 WAS**		
	0g	2g	4g	0g	2g	4g
E8	44.4	55	66.7	56	39.4	33.64
EX sudan	61.1	50	61.1	60.15	45.04	35.43

Ncriben 03	61.1	44.4	72.2	61.84	44.28	37.34
Nciben 02	66.7	61.1	72.2	61.47	47.37	36.01
LSD (P=0.05)	3.34			3.51		

Effect of different concentrations of Mancob M and varieties on number of infected pods, days to shattering, and seed yield (kgha^{-1})

Result on the effect of different concentrations of Mancob M and varieties on number of Infected pods, Days to shattering, and Seed yield (kgha^{-1}) is presented in Table 5. The result showed no significant (P > 0.05) difference between varieties and the different levels of concentration. However, for the number of diseased pods, Ex sudan recorded the highest number which is 104.40 followed by NCRIBEN 03 which recorded 92.70. NCRIBEN 02 recorded the least number of diseased pods with 56.00. For days to shattering, variety E8 recorded the highest which is 102.60 while Ex sudan followed with 101.40. NCRIBEN 03 recorded the least days to shattering which is 99.30. For yield per hectare, NCRIBEN 03 recorded the highest yield of 843 kgha^{-1}, followed by NCRIBEN 02 which recorded 815 kgha^{-1}, Ex sudan recorded the lowest yield with 720 kgha^{-1}.

Table 5: Effect of different concentrations of Mancob M and Variety on Number of Infected Pods, Days to shattering and Total Seed yield (kgha^{-1})

Varieties (V)	No of disease pod	Days to shat.	yield/ ha
E8	65.4	102.6	725
Ex sudan	104.4	101.4	720
NCRIBEN 03	92.7	99.3	834
NCRIBEN 02	56	100.7	815
LSD	53.1	2.935	180.9
Concentration (C)			
0g	73.1	99.7	765
2g	85.5	101.3	843
4g	80.3	102	713
LSD	40.16	2.361	279.2
V & C	NS	NS	NS

The concentrations also showed no significant (P > 0.05) difference on the number of disease pods, days to shattering, and yield/ ha. Likewise there was no interaction between the varieties and concentration of Mancob M.

Experiment II:

Isolation of Cercospora leaf spot

The diseased symptoms identified to be fungal in nature was examined for microscopic and macroscopic features to screen for symptoms of pathogens associated with sesame foliar disease. The fungus was irregular, septate, light brown and thick walled. Conidiophores were seen produced in cluster and are 1-3 septate seen at the tip and light brown coloured condia were elongated, 7-10 septate hyaline, broad at the base and tapering towards the apex. (Anonymous). The conidiophores are epiphyllous, unbranched, single or loosely packed fascicles. Growth habit is sometimes dark brown, densely cushion-like colonies, cottony mycelia growth, one type often mutating from the other. (Plates 5).

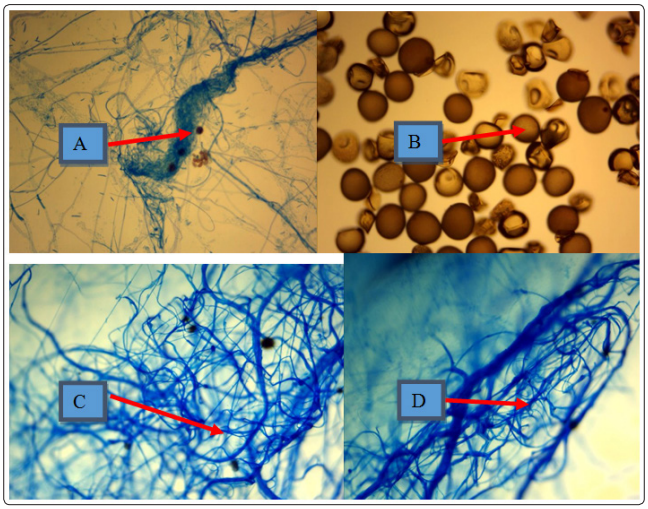

Plate 5: Micrograph of *Cercospora sesami* showing A: Conidia, B: Spores, C: Conidiophores, D: Mycelium.

Discussion

Effect of Different Concentration of Mancob M and Varieties on Plant Establishment, Plant Height, Number of Branches and Days to 95% Flowering

Although there was slight variation among varieties with respect to number of branches, there was however, no significant difference among the treatments for percentage establishment, plant height and Days to 95% flowering. The lack of variation was not only seen in the varieties but also among the different levels of Mancob M concentrations. Plant establishment can be influenced by environmental conditions e.g. rainfall and relative humidity which favoured disease development leading to poor emergence and establishment. It is generally true that pathogenetic organisms are sensitive to their environment particularly during infection and establishment process. Temperature and humidity are the most important variables with humidity being particularly critical for shoot diseases [8,9]. Nahunnaro et al., (2007) reported that early to late June sown cotton recorded 65.67% and 85.33% plant establishment respectively [10]. This period was considered most appropriate for better emergence and establishment of plants particularly in Yola. Cercospora leaf spot have been reported to individually or collectively influence the growth, development and yield of sesame [11].

The different concentration levels did not show any variation in plant height among the sesame varieties. This is in conformity with the work of Uwala (1993) which suggested that among different agronomic parameters measured, the total number of branches, plant height and number of capsules were positively correlated with the overall yield. The weather factors cumulatively have tremendous effect on leaf spotting activity of the pathogen and consequently influence plant height and number of branches which in turn affects the seed yield of sesame. Olowe (2007) found significant positive relationships between grain yield and plant height at 50% flowering and physiological maturity.

The mean value for number of branches varied from 8.78, recorded by E8 which is the highest, to 7.00 recorded by NCRIBEN 02

which is the lowest. The investigation which was taken at 8 WAS, revealed slight significant difference within the varieties and also respective varieties of sesame seemed to exhibit a close range of good development and increase in growth parameters. This is further validated by Uwala (1998) who also inferred that among the agronomic parameters, total number of branches, plant height and capsule numbers were positively correlated with seed yield [3]. Khan et al (2009) who found out that number of branches per plant, pods per plant and seed yield of sesame were influenced by different management practices [11].

Days to 95% flowering in this study showed very slight or no difference among the varieties. The different varieties were found to flower at close range periods. All characters related to maturity, first flowering, 50% flowering and 95% flowering had a negative correlation with growth and yield of sesame crop. Muhamman et al., (2010), Onginjo et al., (2009) in a correlation studies involving 30 selected mutants lines and two cultivars reported that seed yield had a strong positive and significant relationship with biomass yield, harvest index and 100 seed weight but plant height, oil content, number of capsules and days to flowering had a weak positive significant correlation with seed yield [12,13].

Effect of Different Concentrations of Mancob M and Varieties on the Incidence of Cercospora Leaf Spot of Sesame at 5-8 WAS

Effects of Mancob M and varieties on disease incidence of Cercospora leaf spot showed that the disease progressed steadily from 5-8 WAS. Vender Plank (1963) studied the rate of disease development and observed that Cercospora leaf spot is a compound interest disease which completes many generations on the crop in a season [14]. Uddin et al., (2003) also found out that there is a gradual increasing trend for both disease incidence and severity within increase in days after sowing. This finding is in agreement with the works of Tunwari and Nahunnaro (2016) and Rohan (2011) in their survey, revealed increase in disease incidence with increase in weeks after sowing. They also reported increase in the disease prevalence at 8 WAS [15]. The gradual process of CLS and the increase observed is a confirmation of the fact that the disease progressed slowly and becomes severe only towards physiological maturity which was probably due to high build up of relative humidity with time. Sesame is most susceptible to Cercospora leaf spot at 8–10 weeks of growth. As such control of Cercospora leaf spot on sesame is most critical between 8 and 10 weeks of age.. The magnitude of this increase in rate of disease progress may have been related to varying environmental conditions on components of the infection cycle of CLS disease. The reduced rate of disease development in E8 as observed from 5-8 WAS, may be due to the level of resistance of the varieties against *Cercospora specie*. These findings confirmed the works of Kolt (1984) and Eman (2011) who reported that the resistant gene of genotypes was one of principal factors influencing Cercospora incidence.

Effect of Different Concentration of MancobM and Varieties on Disease Severity of Cercospora Leaf Spot of Sesame at 5-8 WAS

The result on effect of concentrations of MancobM and variety on disease severity revealed a gradual increase in severity of the disease overtime. The study showed a significant difference among varieties at 7WAS. NCRIBEN 03 recorded 31.71% followed by Ex-Sudan with 30.13%. E8 recorded the lowest severity osf 26.17%. The performance of this particular variety may be related to its moderate resistance to the pathogen and influence of environmental factors. The result further revealed that none of the varieties tested was immune to Cercospora leaf spot. It was also observed that none of the sesame varieties tested was highly susceptible to Cercospora leaf spot. This agree with report of Rajput et al., (1998) who screened one hundred and seven (107) genotypes of sesame under field condition against *M. phaseolina* and found out that only (1) genotype showed immune reaction. In Nigeria, Iwo et al., (1998) documented the evaluation for leaf spot disease among newly developed sesame inbred lines and observed that most of the sesame lines were moderately resistant to leaf spot disease caused by *Cercospora, sesami*. El- Bramawy and Abd Al-Wahid (2009) during their evaluation of twenty-eight (28) sesame genotypes, found out that, among the sesame varieties tested, no plant was immune to Cercospora leaf spot of sesame. Disease severity is an important factor in determining the performance and yield of sesame as high disease severity has been found to affect photosynthesis which in turn ensures reduction of assimilates for the plants.

Effect of Different Concentrations of Mancob M and Varieties on Number of Diseased Pods, Days to Shattering and Yield/Ha

Concentrations of Mancob M and Varieties on the number of diseased pod and days to shattering shows no significant variation among the varieties and also the different levels of concentration. Appearance of the disease symptoms on the pots signifies a level of disease severity.

All the varieties shattered nearly at the same period. The study further revealed that there was a highly significant relationship between diseased pods and seed yield. It was found that branches per plant, pods per plant and seed yield of sesame were significantly influenced by different management practices such as weeding, application of fertilizer and insecticides. Similar works on sesame varieties and their reactions against infection by the major fungal diseases and their effect on yield components were evaluated by Ragab et al., (2001) which found positive correlation between yield components, and disease manifestation.

There was a highly significant negative correlation between Cercospora leaf spot severity and growth yield parameters. This is a clear indication that disease can cause significant reduction in grain yield directly proportional to the severity of the infection. This is in conformity with the works of Uwala (1998) who also revealed negative correlation between disease severity and seed yield. Anonymous (2007) also indicated that rainfall, minimum temperature and relative humidity had a positive correlation with the disease development. It is generally true that pathogenic organisms are sensitive to their environment particularly during infection and establishment process.

Conclusion

Cercospora leaf spot of sesame was found to be prevalent in the study area.4g Mancob M exhibited the capacity of reducing incidence and severity of Cercospora leaf spot disease of sesame compared to 2g and 0g. A reduced rate of the disease development was observed in Variety E8 which tends to be higly resistant. Among the four varieties tested, NCRIBEN 03 tends to be more susceptible to the disease.The result further revealed that none of the varieties tested was immune to Cercospora leaf spot. It was also observed that none of the sesame varieties tested was highly susceptible.

Recommendations

1. Further trials should be carried out on control of Cercospora leaf spot of sesame using different levels of concentrations of Mancob M in different locations.
2. Similar investigation should be carried out using more different varieties in different locations.
3. Since resistant varieties to Cercoscopora leaf spot are not available to the farmers in the study area, synthetic chemicals and use of plant materials might be the next option to adopt for reducing build up of innoculum.

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