ISSN: 3121- 6897 *Publication of the school of sciences Adamawa State College of Education, Hong* Published Nov. 2025

Effects of Different Concentrations of Manc0b M for the control of Cercospora Leaf Spot Disease (Cercospora Sesami Zimm) on the growth rate of some Sesame Varieties in Yola Nigeria

Akami Praise Shadrach
Department of Biology, Federal College of Education Yola Nigeria.

Correspondence: akami.ps@gmail.com

Abstract

Cercospora leaf spot of sesame is a disease caused by a fungi Cercospora sesami, it affects all parts of the plants above the ground, resulting in complete defoliation which leads to severe economic loses. Two sets of experiments were carried out. The first and second experiments were conducted in Modibbo Adama University of Technology Yola at the Crop Production and Horticulture and Plant Science Departments respectively. 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 (0g, 2g 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 were subjected to analysis of variance for a randomized complete block design using SAS (1999) statistical package. The treatment means that are significantly different were separated using the Least Significant Difference at P=0.05. 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. For the concentrations, 2g recorded a higher yield of 843 kg/ha followed by 0g which recorded 765 kg/ha. Conclusively, Cercospora leaf spot of sesame was found to be prevalent. E8 has a higher resistance to the disease while NCRIBEN 03 tends to be more susceptible. It is therefore recommended that further trials should be carried out using different varieties in different locations.

Keywords: Cercospora sesami, *sesame, Mancob-M fungicide, disease incidence, varietal resistance, RCBD*

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 (Bisht *et al.*, 1998).

Sesame or beniseed is called „Riidi. in Hausa, Igogo in "Igbo" and "Yanmoti" in Yoruba. 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. India is generally held as the subcontinent where Sesame was first domesticated and then spread to other parts of the world such as Africa, East countries, China and America (Bedigian, 2004). Today Asia and Africa are the major producers of Sesame in the world, with Asia producing more than half of the global production.

(Haruna, 2012). It is also widely produced in India, China, Korea, Japan, Turkey, Thailand, Vietnam as well as America. Sesame was introduced to Nigeria after the Second World War. It has been regarded since then as a crop of insignificant importance compared to groundnut and other cash crops. Beniseed is widely grown in the Northern and Central parts of Nigeria initially as minor crop until 1974, when it became one of the major cash earners in many Northern states of Nigeria (Stonebridge, 1993). The crop can be grown twice as an early or late crop, or once a year depending on the ecological zone. The early crop is sown at the onset of rain in the Savannah region which is March/April while the late crop is sown two months before the end of rains (mid July – early August).

Asia and Africa are the major producers of Sesame in the world, with Asia producing more than half of the global production. In 2007, Asia produced 2.4 million short tons of whole Sesame seed, while Africa produced 1.2 million short tons of Sesame (UN/FAO, 2008).

Sesame seed contains methionine, a deficient amino acid in many leguminous plants (Enikuomehin and Peters, 2002). Due to its composition of high level of unsaturated fatty acid (80%) and antioxidants. It is considered to prevent diseases of different kinds and is also used in application areas such as pharmaceuticals, industrial and as biofuel.
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 (Amusa et al., 1994). 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 (Akinbode and Ikotun, 2008). Several attempts have been made to control cercospora leaf spot of sesame through cultural,

physical, chemical, and biological methods. However, because fungi have very large host range, more so, absence of durable resistance of sesame cultivars and varieties in the field is a major problem, which has been attributed to the high levels of virulence in pathogen populations (Ghaffer, 1988). Another limitation is that farmers use cultivars that are susceptible or pesticide resistant cultivars. Control of plant-parasites, essentially, involves the use of synthetic pesticides. However, apart from its very high cost, indiscriminate and unsafe use, increased concern for the environment and the inherent danger posed to man and his livestock calls for caution in its utilization (Adegbite and Adesiyan, 2005). However, it has been recommended that integrated pest management such as use of resistant or tolerant variety, limited use of fungicides and good agricultural practices has been advocated as means of increasing crop yield. The search for resistant varieties has posed serious concern to sesame farmers, researchers and breeders. Many researchers have have reported the lack of immune sesame genotypes which have the inherent ability to change their resistant classes between locations and seasons. (Li *et al*.,1991; Iwo et al.,1998). Hence, this study is aimed at evaluating some sesame varieties and a fungicide that could aid in the management and control of Cercospora leaf spot of sesame.

Materials and Methods

The field experiment was carried out during the raining season of 2016. using a Randomized Complete Block Design (Fig.2) 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 lea Diseased sesame leaves showing legions of cercospora leaf spot 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.

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 beniseed 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 to the fertilizer requirement of the crop.

Isolation of fungal pathogens

Diseased leaves of sesame with the symptom of fungal infectionas 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 (Larone, 1995). 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 (28-30 oC) 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.

Plate 2: Sesame Farm at 7 WAS

Plate 3: Minutes water soaked lesions on stems and petioles.(Symptoms of Cercospora infection)

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. Numbers 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:

$$\text{Seed yield (kg/ha)} = \frac{\text{Seed weight (kg) of net plot}}{\text{Harvested net plot area (m}^2\text{)}} \times 1000m^2 \quad (1)$$

Disease Parameters

Disease incidence was determined by counting the number of tagged plants that exhibited

symptoms of Cercospora leaf spot using the formula below:

$$\text{Disease Incidence} = \frac{\text{Total number of disease plants}}{\text{Total number of plants sampled}} \times 100 \quad (2)$$

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

Results

Experiment 1: Field Experiment

Effects 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.

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. 3 and 4. 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%.

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%.

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

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 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 4 and 5. 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.

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 66.7% 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.

Effect of different concentrations of Mancob M and varieties on number of infected pods, days to shattering, and seed yield (kg/ha)

Result on the effect of different concentrations of Mancob M and varieties on number of Infected pods, Days to shattering, and Seed yield (kgha) 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 kg/ha followed by NCRIBEN 02 which recorded 815Kg/ha, Ex sudan recorded the lowest yield with 720 kg/ha. 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.

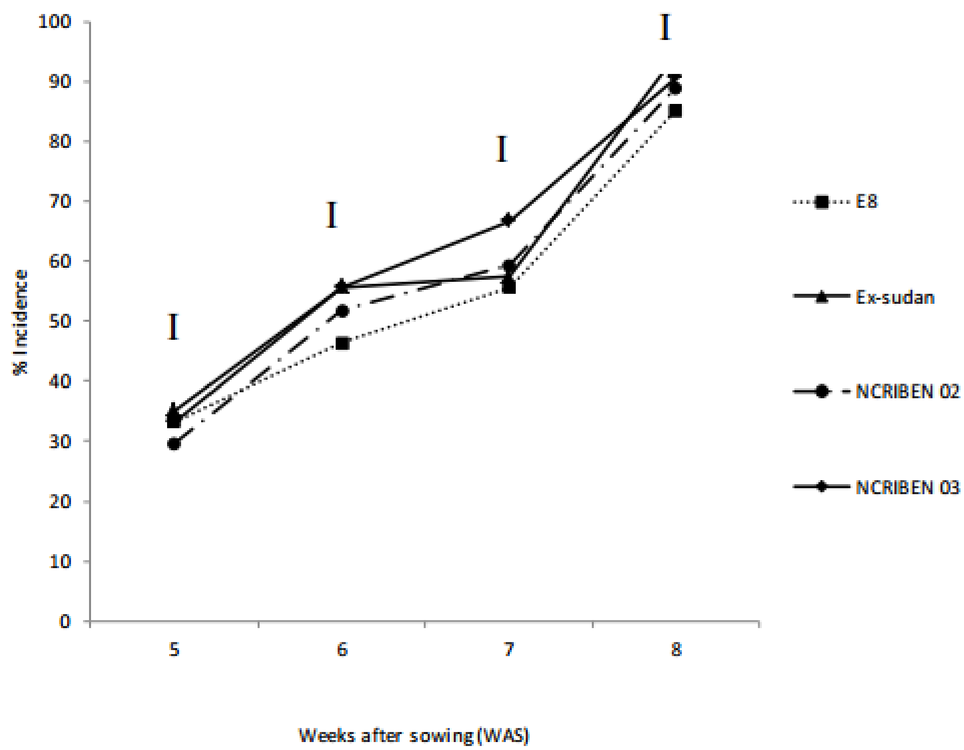

Fig 1: effect of disease incidence on different varieties of cercospora leaf spot of sesame at 5-8 weeks after sowing (WAS)

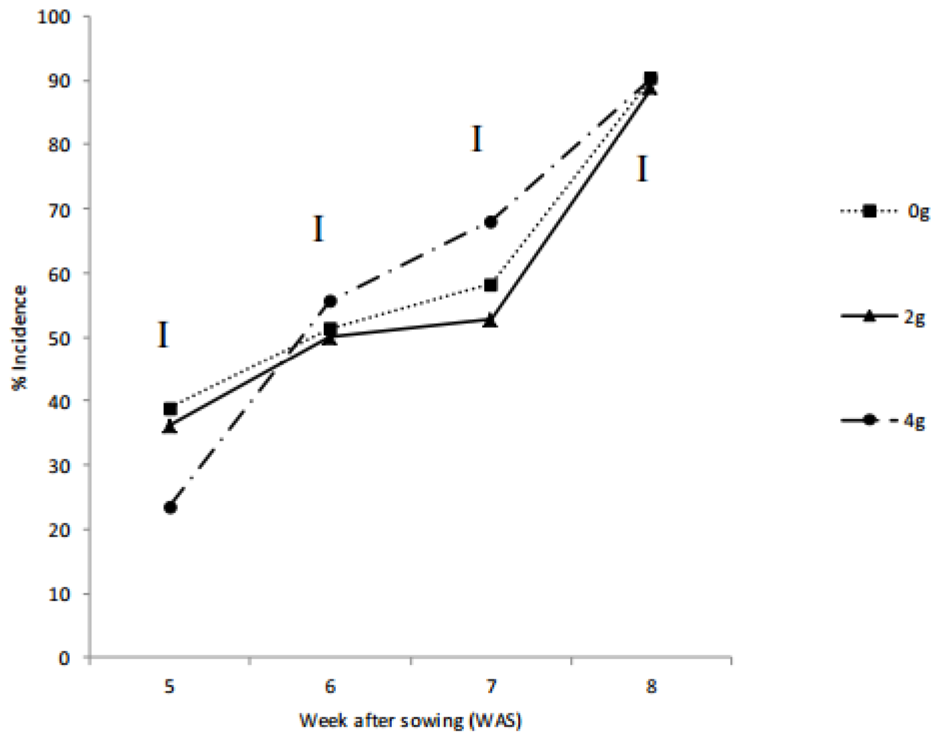

Fig 2: effects of different concentration of Mancob M on disease incidence of cercospora leaf spot of sesame at 5-8 weeks after sowing (WAS)

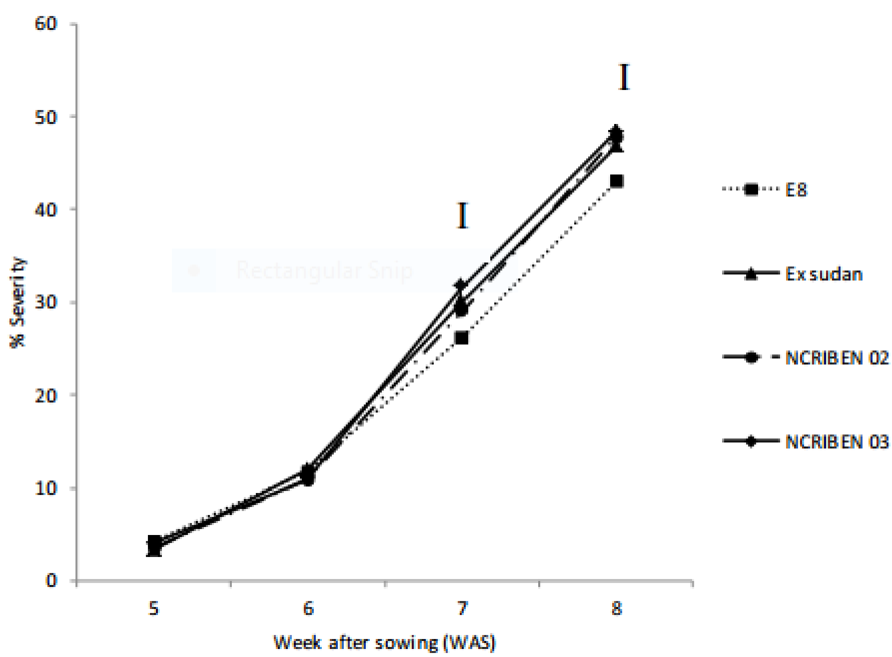

Fig 3: effects of variety on disease severity of cercospora leaf spot of sesame at 5-8 weeks after sowing (WAS)

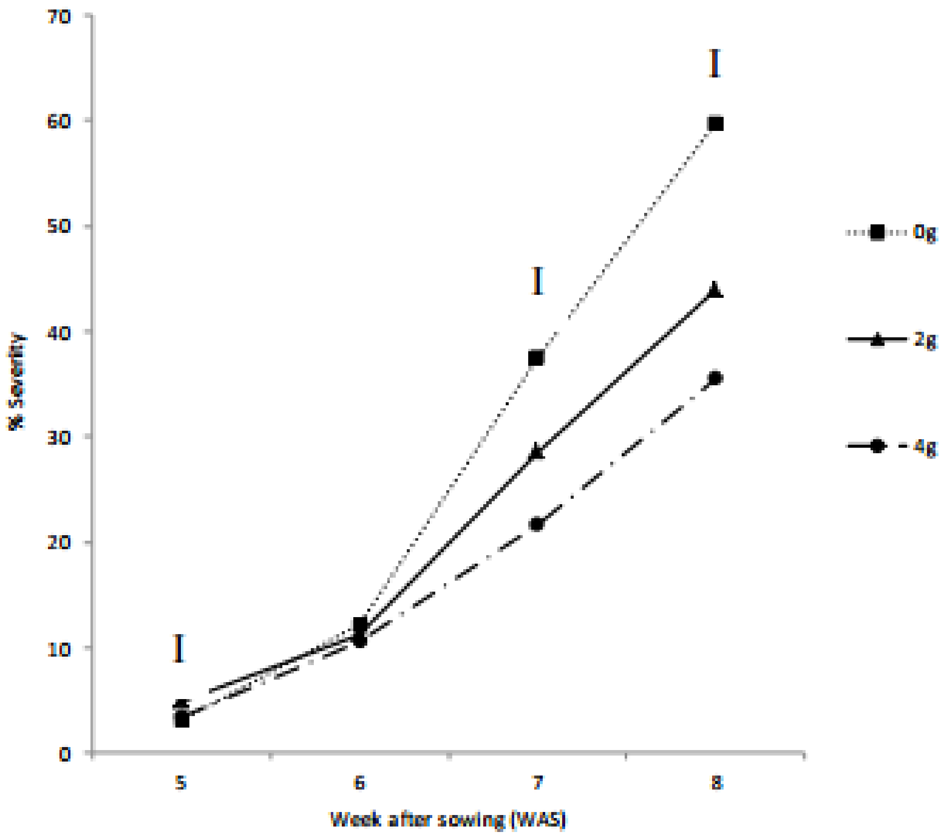

Fig 3: effects of different concentration of Macob on disease severity of cercospora leaf spot of sesame at 5-8 weeks after sowing (WAS)

References

Bedigan, D. (2004). History and lore of sesame in south west Asia. *Economic Botany*, 58(3), 329–353.

Bisht, I. S., Mahajan, R. K., Loknathan, T. R., & Agrawal, R. C. (1998). Diversity in Indian sesame collection and stratification of germplasm accessions in diversity groups. *Genetic Resources and Crop Evolution*, 45(4), 325–335.

Enikuomehin, O. A. (2005). Cercospora leaf spot disease management in sesame (*Sesamum indicum* L.) with plant extracts. *Journal of Tropical Agriculture*, 43(1-2), 19–23.

Enikuomehin, O. A., & Peters, O. T. (2002). Evaluation of crude extracts from some Nigerian plants for the control of field diseases of sesame (*Sesamum indicum* L.). *Tropical Oilseeds Journal*, 7, 84–93.

Food and Agriculture Organization of the United Nations. (2003). *Production yearbook 2002* (Vol. 56). FAO.

Khan, A. R., Ijaz, M., Haq, I. U., Farzand, A., & Tariq Javed, M. (2014). Management of cercospora leaf spot of groundnut (*Cercospora arachidicola* & *Cercosporidium personatum*) through the use of systematic fungicides. *Cercetări Agronomice în Moldova*, 47(2), 71–80.

Khan, M. A. H., Sultana, N. A., Islam, M. N., & Mirza Hasanuzzaman. (2009). Yield and yield contributing characters of sesame as affected by different management practices. *American-Eurasian Journal of Scientific Research*, 4(3), 195–197.

Khan, M. A., Abdul, R., & Chohan, R. A. (2000). Biological control of bacterial blight of cotton using some plant extracts. *Pakistan Journal of Agricultural Science*, 37(3-4), 167–169.

Larone, D. H. (1995). *Medically important fungi: A guide to identification* (3rd ed.). ASM Press.

Muhamman, M. A., Gungula, D. T., & Sajo, A. A. (2009). Phenological and yield characteristics of sesame (*Sesamum indicum* L.) as influenced by nitrogen and phosphorus rates in Mubi, Northern Guinea Savanna ecological zone of Nigeria. *Emirates Journal of Food and Agriculture*. http://www.ejfa.me/.

Stonebridge, W. C. (1993). *Beniseed variety and sowing method trial* (Technical Report No. 281-9). Institute for Agricultural Research.

Uwala, A. C. (1998). Evaluation of chlorothalonil, benlate and agrimycin 500 on the control of leaf spot disease and their effects on the yield of sesame in Southern Guinea Savannah. In L. D. Busari, A. A. Idowu, & S. M. Misari (Eds.), *Proceedings of the 1st National Workshop on Beniseed* (pp. 201–206). National Cereals Research Institute.