



Effect of Cultivar on the Incidence and Severity of Yellow Vein Mosaic Disease on Okra (*Abelmoschus esculentus* (L.) Moench) in Wukari, Taraba State, Nigeria.

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ABSTRACT

The management of Yellow Vein Mosaic Disease on Okra (*Abelmoschus esculentus*) is a problem in Nigeria. Studies on the Effects of Cultivar on the Incidence and Severity of Yellow Vein Mosaic Disease on Okra in Wukari Local Government Area of Taraba State Nigeria, was carried out in 2021 cropping season. The experiment was conducted in a screen house, at Federal University Wukari Teaching and Research Farm. Fresh okra leaves infected with the okra vein mosaic disease were collected and pounded into jelly-like form using mortar and pestle, which were used to inoculate the experimented plants. The objectives of the study were: to determine the effect of cultivars on the incidence and severity of vein mosaic disease on okra and to determine the yield potential of these cultivars under vein mosaic disease infestation. The experiment was laid out in Complete Randomized Design (CRD). Data were taken on growth and yield parameter. The data collected were subjected to Analysis Of Variance (ANOVA) and the means were separated using Least Significant Difference (LSD) at 5% level of probability. Perkins long and Gobig had the highest incidence of the disease (7.44), (5.22) respectively and Basanti 447 shows high level of resistance (2.00) to the disease. Base on the finding of this research it is recommended that farmers should adapt Basanti 447 cultivation in the study area because of its ability to resist the disease and give the expected yield potential.

INTRODUCTION

Okra (*Abelmoschus esculentus* (L.) Moench) was originated around Ethiopia during the 12th century and was cultivated by the ancient Egyptians. (Adetuyi, 2008). Currently the crop is grown as a popular vegetable and its cultivation has spread throughout the Middle East and North Africa. (Akhtar *et al.*, 2014). The crop is grown in many parts of the world especially tropical and subtropical countries (Ali and Serkern, 2000). In Africa, the crop is mostly cultivated in the western part of the continent, this region accounts for 75% of okra produced in Africa, (Asare, *et al.*, 2000).

Okra has been found industrially and medically useful, its mucilage is useful as an agent in some pharmaceutical industries for blood volume expander and plasma replacement (Aziz *et al.*, 2011). Its fruits have high dietary nutritive value with up to 20% protein (Asare, *et al.*, 2000). It plays a vital role in human diet, the fruits can also be consumed fresh, boiled, fried or cooked (Ali *et al.*, 2005). The leaves are eaten as vegetables and also considered as a good cattle feed (Anjorin *et al.*, 2013).

Despite being an important crop, its production is faced with challenges ranging from pest and diseases infestation, the major disease of okra is okra yellow vein mosaic (OYVM), it is a viral disease caused by the virus; okra yellow vein mosaic virus (Appiah, *et al.*, 2020). This disease is responsible for global yield losses in the production of the crop, infected plants produced poor quality pods (Asare *et al.*, 2014). Yield loss due to this disease is up to 80-90% under heavy infection particularly when infection occurred early (Benchasri, 2012). In view of this, the research was conducted to evaluate the effect of cultivars on the incidence and severity of yellow vein mosaic disease on okra, in Wukari, Taraba State Nigeria. The objectives of the study were to determine the effects of cultivars on the incidence and severity of yellow vein mosaic disease on okra and to determine the yield potential of these cultivars under okra yellow vein mosaic disease infestation.

MATERIAL AND METHOD

The experiment was carried out in the Teaching and Research Farm of Federal University Wukari. Wukari is situated on latitude 7° 52'17.00"N and longitude 9° 46'40.30"E. It falls within the Guinea savannah of North-east Nigeria with annual rainfall of 1058mm-1300mm and the relative humidity dropping to about 15% alongside with the annual temperature of 28°C and 30°C. Its characteristic alfisol soil is clay enriched with subsoil that has relatively high native fertility suitable for the cultivation of many crops such as yam, soybean, sorghum, maize, rice and other fruits and vegetables (Adepoju *et al.*, 2021). The experiment was carried out

at the Green House of Federal University Wukari Teaching and Research Farm of Faculty of Agriculture and Life Science Wukari, Taraba State.

Experimental Design and Treatment

The design used for this experiment was Complete Randomized Design [CRD] with spacing of 2m x 2m inter and intra row spacing. Four local cultivars and one improved cultivar of okra seed were used.

Source of Seed

The seeds were of four different local cultivars and one hybrid or improved cultivar. The four local cultivars were purchased from Wukari main Market and the hybrid seed was purchased from Agro shop in Wukari main Market.

Description of seeds

Clemson spineless

Is the most popular variety of okra in the market. The plants produce uniform, straight pods that are spineless, making harvest easier. It can be served fried, cooked, or pickled. This variety is very prolific and high yielding, maturing in about 55 days.



Plate 1: Clemson Spinlet

Ladies Finger

Ladies finger seed, is one of the okra that is a mouthwatering vegetable, due to its green palatability to make tasty sub. It is a green vegetable with long fingerlike, having a small tip at the tapering end. Its head shows a bulge, lighter green in shade, which is often removed as inedible portion. When prepared, the taste is very specific to the vegetable and generally like by children.



Plate 2: Ladies fingers seed

Basanti 447

This is an improved cultivar seed that produces erect plant with very good vigor and good branching tendency. It is an early hybrid with good maturity. The harvesting stage for best eating quality is when pods reach a length of 15 – 17 cm pods. The pod is slender, and the colour is dark green. Specimen or both, plants are tall, topping out at up to seven feet with a diameter of up to five feet.



Plate 3: Basanti 447 seed

Perkins long pod:

This heirloom is an early variety suitable for growing in northern and southern climates. It may grow to five feet in height, and bear straight green pods that are about four inches long.



Plate 4: Perkins long pod seed

Go big

This is a good pick if you're looking for a wealth of edible fruit, a striking ornamental specimen or both, plant are tall, topping out at up to seven feet with a diameter of up to five feet.



Plate 5: Go big seed

Planting / Sowing and Agronomic Practices

Planting operations

15 Seeds per pot was used in planting; it was filled with soil mixed with cow dung.

The soil was watered and allow for some time and three okra seeds per pot were sown. Weeding was done at interval.

The thinning of the plant was carried down to one plant per stand at two (2) weeks.

Experiment: Process for Collection and Inoculation of Okra Vain Mosaic Disease.

A fresh okra leaves infected with the okra vain mosaic disease were collected and pounded into jelly-like form using mortar and pestle, which were used to inoculate the experimented plant. The inoculation process was carried out by dusting on each plant at early stage of germination.

Data collection

Plant height

The plant height was measured and recorded from the ground level to the plant apex starting from week two after sowing (2WAS) to week four respectively.

Number of leaves

Each plant leaves were counted and recorded from week two to week four after sowing.

Number of flowers

At flowering, plant flowers was also counted and recorded, starting from week two to week four.

Number of fruits

Each fruit on each plant were also counted at week two to week four.

Fruit weight per pot

The fruit were harvested and measured using a sensitive measuring scale in gram (g) and were Recorded.

Disease incidence and severity

The disease incidence and severity was determined and recorded, using the scale below adopted by Jakada *et al.*, 2021.

1. = No symptoms
2. = Very slight symptoms
3. = Slight symptom but still negligible
4. = 50% symptoms
5. = All plants present symptoms of chlorosis
6. = 25% stunted
7. = 50% stunted without fruits
8. = > 50% stunted with few fruits
9. = No fruit were observed

Data Analysis

All the data collected were subjected to Analysis of variance (ANOVA) appropriate to randomize complete design using Statistical Analysis software (SAS) Version 14.00 and the means were separated using Least Significance Difference (LSD) at 5% level of significance.

RESULTS***Effect of Cultivar on Plant Height of Okra (cm) infected with YVMD in Wukari in 2021 cropping season.***

Effect of cultivar of plant height of okra infected with YVMD is presented in table 1: The result revealed that there was highly significant ($p \leq 0.01$) difference among the cultivars at 2WAS. Basanti 447 recorded the tallest plant with (23.5) followed by Ladies finger with (17.65) and the least was observed in Go Big with (10.44). Similarly at 3 WAS the result revealed that there was highly significant ($p \leq 0.01$) difference. At 3 WAS Basanti 447 recorded the tallest plant, (38.12) followed by Ladies Fingers with (22.41) and the least was recorded in Perkins Long Pod with (10.50). At 4 WAS, similar trend was observed, the result revealed that there was highly significant ($p \leq 0.01$) difference at 4 WAS. Basanti 447 recorded the tallest plant with (55.52) followed by Ladies finger with (47.42) and the least was observed in Clemson spineless with (45.12).

Table 1: Effect of Cultivar on Plant Height of Okra (cm) infected with YVMD in Wukari in 2021 cropping season.

Treatment	Plant heights		
	2WAS	3WAS	4WAS
Clemson spineless	14.57	20.31	45.12
Ladies finger	17.65	22.41	47.42
Basanti 447	23.52	38.12	55.52
Perkins long pod	8.34	10.50	20.15
Go big	10.44	15.30	30.15
LSD	2.28	4.13	4.19
Significance	**	**	**

KEYS

YVMD = Yellow Vein Mosaic Disease

LSD = Least Significance Difference

** = Highly significant

WAS = Week After sowing

Effect of cultivar on number of Flower of Okra infected with YVMD in 2021 cropping season.

Effect of cultivar on number of Flower of okra infected with YVMD is presented in table 2: The result revealed that there was highly significant ($p \leq 0.01$) difference at 3WAS. Basanti 447 recorded the highest number of Flower with (17.42) followed by Ladies Finger with

(13.54) and the least were observed in Perkins Long Pod with (8.32). Similar trend was observed at 4 WAS. The results revealed that there was highly significant ($p \leq 0.01$) difference at 4 WAS. Basanti 447 recorded the highest number of flower with (25.48) followed by Ladies Fingers with flowers number of (16.71) and the least was recorded in Perkins Long Pod with (10.44).

Table 2: Effect of Cultivar on number of Flowers of okra infected with YVMD in Wukari in 2021 cropping season.

Treatment	Plant Flowers	
	3WAS	4WAS
Clemson spineless	11.21	13.31
Ladies finger	13.54	16.71
Basanti 447	17.42	25.48
Perkins long pod	8.32	10.44
Go big	10.44	12.42
LSD	1.14	2.53
Significance	**	**

KEYS

YVMD = Yellow Vein Mosaic Disease

LSD = Least Significance Difference

** = Highly significant

WAS = Week After sowing

Effect of Cultivar on number of Fruits of Okra infected with YVMD in Wukari in 2021 cropping season.

Effect of cultivar on number of Fruits of okra infected with YVMD is presented in table 3: The result revealed that there was highly significant ($p \leq 0.01$) difference at 3WAS. Basanti 447 recorded the highest number of

Fruit with (15.31) followed by Ladies Finger with (10.54) and the least were observed in Go big with (8.33). At 4WAS the results revealed that there was highly significant ($p \leq 0.01$) difference among the cultivars. At 4 WAS Basanti 447 recorded the highest fruits with (18.51) followed by Ladies Fingers with (11.52) and the least was recorded in Perkins Long Pod with (10.00).

Table 3: Effect of Cultivar on number of Fruit of okra infected with YVMD in Wukari in 2021 cropping season.

Treatment	Number of Fruits	
	3WAS	4WAS
Clemson spineless	9.31	10.32
Ladies finger	10.5	11.52
Basanti 447	15.31	18.51
Perkins long pod	7.00	8.22
Go big	8.33	10.00
LSD	1.12	2.49
Significance	**	**

KEYS

YVMD = Yellow Vein Mosaic Disease

LSD = Least Significance Difference

** = Highly significant

WAS = Week After sowing

Effect of Cultivar on Fruit Weigh of Okra (g) infected with YVMD in Wukari in 2021 cropping season.

there was highly significant ($p \leq 0.01$) difference. Basanti 447 recorded the highest fruit weigh with (30.66) followed by Ladies Finger with (25.00) and the least fruit weigh was observed in Perkins Long Pod with (10.21).

Effect of cultivar on fruit weigh of okra infected with YVMD is presented in table 4: The result revealed that

Table 4: Effect of Cultivar on Fruit weigh of okra infected with YVMD in Wukari in 2021 cropping season.

Treatment	Fruit weigh (g)
Clemson spineless	19.25
Ladies finger	25.00
Basanti 447	30.66
Perkins long pod	10.21
Go big	15.21
LSD at 5%	3.13
Significance	**

KEYS

YVMD = Yellow Vein Mosaic Disease

LSD = Least Significance Difference

** = Highly significant

Effect of Cultivar on Disease Incidence infected with YVMD in Wukari in 2021 cropping season.

The result of effect of cultivar on disease incidence infected with YVMD is presented in table 5: The result revealed that, there was highly significant ($p \leq 0.01$)

difference among the cultivar on disease incidence. The highest incidence of the disease was observed or recorded in Perkins long pod with (7.44) followed by Go big which had the disease incidence of (5.22) and the least was recorded in Basanti 447 with (2.00)

Table 5: Effect of Cultivar on Disease Incidence and severity on okra infected with YVMD in Wukari in 2021 cropping season.

Treatment	Disease Incidence
Clemson spineless	4.33
Ladies finger	3.11
Basanti 447	2.00
Perkins long pod	7.44
Go big	5.22
LSD	0.18
Significance	**

DISCUSSION

Effect of cultivar on growth and yield parameters of okra on the incidence and severity of Yellow Vein Mosaic Disease of Okra in wukari in 2021 cropping season.

The result of the experiment showed that growth parameter was affected by cultivars. Cultivar has highly significant ($p \leq 0.01$) influence on plant height. The result revealed that taller plant was observed in Basanti 447 consistently. This shows that Basanti 447 has high level of resistance to Yellow Vein Mosaic Disease (YVMD) hence growing vigorously than other variety. This finding is in line with Bhyan, *et al.*, (2007) that Basanti 447, Ladies Finger, Clemson Spineless have high level of resistance to YVMD compared to Perkins Long pod and Go big.

The result showed that there was highly significant effect among the cultivars in yield and yield parameters. Basanti 447 has the highest number of flower, fruit and fruit weight. The significantly highest numbers of yield parameters indicate that Basanti is more resistant to YVMD than ladies Fingers, Clemson Spineless, Perkins Long Pod and Go big. This finding is in agreement with Biswas, *et al.*, (2013) That Basanti 447, Ladies Fingers and Clemson spineless are found to be more resistant than Perkins Long pod and Go Big but less resistance to Basanti 447 on okra vein mosaic disease of okra.

Effect of cultivars on disease incidence of okra infested with Vein mosaic Disease of Okra on okra in Wukari in 2021 cropping season

The results obtained showed that cultivars had highly significant effect on the disease incidence of YVMD. Perkins long pod had the highest incidence of the disease followed by Go big and the least incidence was noted in Basanti 447. The highest incidence recorded in Perkins long pod and Go big may be due to their inability to resist the disease while Basanti 447 emerge with less incidence because it was not susceptible to the YVMD. This research is in line with the findings of Asare, *et al.*, (2014) that Perkins long pod, Go big are susceptible to YVMD while Basanti 447 is highly resistance to YVMD.

CONCLUSION

From the research conducted, it shows that, the effect of cultivars on the incidence and severity of vein mosaic disease on okra is high in local cultivar than in improved cultivar, which shows that, farmers should go for the improved cultivar more, than local cultivar, and the yield potential of improved cultivars under vein mosaic disease infestation is high when compared to local cultivar.

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REFERENCES

- Adepoju, O. I., Jakada, M. A., Oluwatayo, J. I. and Yohanna A. D. (2021). Nematicidal Toxicity Of Selected Plant Extract In The Control Of Root-Knot Nematodes (*Meloidogyne incognita*) in Wukari Taraba. *Lapai International Journal of Agriculture*. Volume 2, Issue 2 Pp473-486
- Adetuyi, F. O. (2008). Antioxidant Degradation in Six Indigenous Okra *Abelmoschus esculentus* (L.) Moench Varieties during Storage in Nigeria. *Journal of Food Technology*. 6 (5):227-23
- Akhtar, S. Khan, A. J. Singh, A. S. and Briddon, R. W. (2014). Identification of a disease complex involving a novel monopartite *begomovirus* with beta-and *alphasatellites* associated with okra leaf curl disease in Oman. *Archives of virology*, 159(5), 1199-1205.
- Ali, M. Hossain, M. Z. and Sarkern, N. C. (2000). *Inheritance of Yellow Vein Mosaic Virus (YVMV) tolerance in a cultivar of okra (Abelmoschus esculentus* (L.) Moench). 111(3):205-209.
- Ali, S. Khan, M. A. Habib, A. Rasheed, S. & Iftikhar, Y. (2005). Management of yellow vein mosaic disease of okra through pesticide/bio-pesticide and suitable cultivars. *International journal of agriculture and biology*, 7(1), 145-147.
- Anjorin, T. S. Jolaoso, M. A. & Golu, M. T. (2013). A survey of incidence and severity of pests and diseases of okra (*Abelmoschus esculentus* L. Moench) and eggplant (*Solanum melongena* L.) in Abuja, Nigeria. *American Journal of Research Communication*, 1(11), 333-349.
- Appiah, A. S., Amiteye, S., Boateng, F. & Amoatey, H. M (2020), Evaluation of okra (*Abelmoschus esculentus* L. Moench) cultivars for resistance to okra mosaic virus an okra yellow vein mosaic virus. DOI 10.1007/s13313-020-00727-3
- Asare-Bediako, E., Addo-Quaye, A., & Bi-Kusi, A. (2014). Comparative efficacy of plant extracts in managing whitefly (*Bemisia tabaci* Gen.) and leaf curl disease in okra (*Abelmoschus esculentus* L.). *American Journal Agricultural Science Technol*, 2(1), 31-41.
- Benchasri S. (2012). Okra (*Abelmoschus esculentus* (L.) Moench) as a valuable vegetable of the world. *Ratarstvo povrtarstvo*, 49(1), 105-112.
- Bhyan, S. B., Alam, M. M., & Ali, M. S. (2007). Effect of plant extracts on Okra mosaic virus incidence and yield related parameters of okra. *Asian Journal of Agricultural Research*, 1(3), 112-118.
- Jakada, M.A., Jada, M.Y; Usman, H.J; Yakubu, U. and Nwokah, T.J. (2021). Effect of Rosette Disease Incidence on Growth of Groundnut (*Arachis hypogaea* L.) as influenced by spacing and cultivar types in North East Nigeria. *Nigerian Journal of Tropical Agriculture*, Vol. 21, pp 57-71

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