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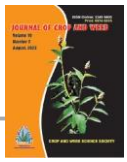

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Performance of AAB genomic group of banana under *Gangetic* Plain of West Bengal

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ABSTRACT

The experiment was conducted to study the growth, yield and fruit characteristics of AAB genomic group of banana under the Gangetic Plain of West Bengal. The cultivars under observation were Dudhsagar, Martaman, Martaman clone III, Poovan, Matta Poovan, Desi Malbhog, Sabri, Amritpani, Krishna Vazai, Kalibhog, Nendran, Champa-I, Champa-II, Champa-III, Alapan, Alpan-Mahnar, Manohar, Chang Monoa, Hill Banana. Theparameters such as pseudstem height, pseudostem girth, leaves/ plant at shooting, days to shooting, days to bunch harvest, crop duration, bunch weight, hands/bunch, fingers/bunch, yield, finger weight, length, girth and T.S.S. were recorded for evaluating the cultivars. The study revealed that the growth, yield, and fruit characteristics varied significantly among different cultivars under observation. Undergrowth characteristics Kalibhog recorded maximum pseudostem height (3.25 m), whereas maximum pseudostem girth was found in Alpan (83.10 cm), Martaman variety produces the highest leaves per plant. The crop duration was ranged from 337.30 days (Hill Banana) to 506.7 days (Nendran). Maximum bunch weight (22.12 kg) was recorded by Dudhsagar variety whereas Hill Banana produces a minimum bunch weight (8.25 kg). Maximum Hands (17.20) as well as maximum finger/bunch (240.3) was produced by Champa Clone I. Highest finger weight (166.3g) was recorded in Dudhsagar, whereas the highest finger length (7.98cm) in Martaman and finger girth (7.15cm) in Poovan. Highest peel: pulp ratio was found in Champa clone II (2.77) while the highest T.S.S was recorded in Martaman (24.7°Brix) followed by Sabri (24.5°Brix). Along with the highest bunch weight and finger weight maximum yield was also recorded in Dudhsagar (44.24-ton ha^{-1}) followed by Alpan-Manohar (37.3 ton ha^{-1}) Champa clone I (33.10 ton ha^{-1}).

***Keyword**:* Banana, growth, yield and AAB genomic group

Banana (*Musa* spp.) is a giant herbaceous monocotyledonous plant that belongs to the family Musaceae of order Zingeberales, which consists of two genera *Musa* and *Ensete* (Ditta *et al*., 2012). It is the 4th most important crop after rice, wheat and corn in the world (Chamling and Bhowmick, 2021). The center of diversity is thought to be Southeast Asia and the Western Pacific (Wang *et al*., 2019). Banana is considered to be one of the most important sources of energy and starchy staple food for the people of tropical humid regions (Davey *et al*., 2013). It also rich in carbohydrate (21.8gm 100g^{-1}), protein (1.1gm 100g^{-1}), potassium (385 mg100g^{-1}), β-carotene(68 µg), niacin(610 µg), vit-C(11.7mg100g^{-1}) and water (74 gm) (Sora and Jibat, 2023). Banana contains 20% sugar. Plantains are nutritionally low protein food material but relatively high in carbohydrates, vitamins and minerals (Adepoju *et al*., 2012). The leading banana-growing states in India include Maharashtra, Gujarat, Karnataka, Kerala, Andhra Pradesh, Tamil Nadu, Andhra Pradesh, Assam, Bihar, Orissa, and West Bengal. In West Bengal, the main growing areas are concentrated in the districts of Hooghly, Howrah, Nadia, Midnapore, Murshidabad, 24-Paraganas, Jalpaiguri, Cooch Behar, Burdwan and North Dinajpur. The modern day cultivated banana is said to be derivation of two wild species: *Musa acuminate* and *Musa balbisiana*. The existence and distribution of wild bananas belonging to genomic group AAB, ABB, ABBB are mostly relevant to north-eastern states of India (Roy *et al*., 2010). In contrast diploid AB genome is mostly confined to southern India. The most economically important cultivated banana types used by farmers worldwide are triploids (Zhan *et al*., 2022). AAB genomic group comprises all the cultivars that have two sets of chromosomes donated by *M. acuminata* (A genome) and one by *M. balbisiana* (B genome) (Zhan *et al*., 2022 and Yadav, 2021).Most of the cultivars of AAB genomic group can be usedfor table purpose. Cultivars are also tolerant to biotic and abiotic stress. In this genomic group there are so many popular cultivars

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like Champa, Martaman, Malbhog, Poovan etc. which are very popular due to their attractive yellow colour,having sweet aromawith highmarket demand. In India and as well as West Bengal there are so many types of banana existing but only a few cultivars have agronomic traits and fruit quality considered suitable for commercial exploitation. Therefore, a scientific study was carried out to find out the best banana cultivars of AAB groups based on growth, yield and fruit quality under Gangetic Plain of West Bengal.

MATERIALS AND METHODS

The present experiment was conducted at the ICAR-AICRP on Fruits, Bidhan Chandra Krishi Viswavidyalaya, Mondouri, Nadia, West Bengal during the period of 2018-2020. The climate of the Research Station is a sub-tropical humid climate where summer and winter both are short and mild with maximum temperatures ranging from 24.35°C to 36.6°C. The cultivars under AAB group observation were Dudhsagar, Martaman, Martaman clone III, Poovan, MattaPoovan, DesiMalbhog, Sabri, Amritpani, Krishna Vazai, Kalibhog, Nendran, Champa-I, Champa-II, Champa-III, Alapan, Alpan-Mahnar, Manohar, Chang Monoa, Hill Banana. Observation on vegetative growth, yield and quality parameters were recorded in Randomized Block Design (RBD) with three replications.Pseudo stem height (m), Pseudo stem girth (cm), Leaves number per plant, Days to shooting, Days to bunch Harvest, and Crop duration (Days) were measured by regular observation in the field. Yield parameters were determined by counting the number of hands or fingers on each bunch. The physical characteristic of the fruit was measured with the help of electronic calipars. The TSS of fruits was estimated with the help of a digital hand refractometer (range 0- 53%). The data obtained was analyzed statistically and the test of significance was done by following the statistical methodin online OPSTAT Software, as described by Panse and Sukhatme (1954).

RESULTS AND DISCUSSION

Growth parameters

There was a significant variation observed in pseudo stem height of different bananas under this group. The data Table 1 revealed that among the cultivars evaluated in the genomic group AAB, maximum pseudo stem height (3.25 m) was observed in Kalibhog and it was statistically at par with Alpan (3.19m) and Alpan-Manohar (3.10 m) but significantly higher than Dudhsagar (3.00m), MattaPoovan (2.98 m), Hill Banana (2.95 m) variety. It was found that Alpan variety produced maximum pseudostem girth (83.10 cm) and this was statistically at par with Chang Monoa (76.70cm) and Alpan Manohar (73.70). While Champa Clone I (56.80) showed a minimum pseudostem girth and this was statistically at par with Amritpani (58.20), MattaPoovan (58.80), Krishna Vazhai (60.10cm) and Champa Clone II (61.30cm). Similar type of results was also recorded by Chakrabarty and Madhava Rao (1980). The maximum number of leaves was observed in Martaman variety (14.30) and statistically at par with Martaman clone III (14.20), Krishna Vazhai (14.10), Manohar (13.60) whereas the minimum (9.90) leaves per plant was found in DeshiMalbhog at shooting and this was statistically similar with the leaf number of Nendran (10.10). Robinson *et al*. (1992) reported that when leaf area is depleted by hail or frost before flowering, the emergence of 4 additional healthy leaves should be sufficient for the development of some marketable fruits. The data presented in the Table 1 showed that Nendran variety required maximum days for shooting i.e. 404 days, whereas minimum days (2230.10) for shooting was recorded in Hill Banna variety followed by MattaPoovan (230.50 days), Poovan (255.50 days), Sabri (255 days). The minimum bunch harvesting time was observed in Sabri (90 days) and this was statistically similar with the Champa Clone I (91days), Amritpani (92 days) variety, whereas maximum time was required for harvesting in Kalibhog variety (115 days). Among the cultivars evaluated in Musa ABB genome, Hill Banana variety showed minimum crop (337.3 days) duration and this was statistically at par with Krishna Vazhai (370 days), Dudhsagar (377days), Hill Banana (337.30 days), whereas significantly higher crop duration was observed in Nendran (506.7 days) and this was followed by Manohar (450 days) variety.Significant difference among cultivars in terms of plant growth might be due to varietal characters in combination with agro-climatic condition of the area. These cultivars are mostly grown in north east India,especially in West Bengal and there are only megre data available on growth parameters.

Yield Parameters

The data in Table 2 revealed that the Dudhsagar variety was produced maximum bunch weight (22.12 kg) and this variety was statistically at par with Alpan-Manohar (18.65 kg), Manohar (17.16 kg), Martaman clone III (16.55 kg) while Hill Banana produced minimum bunch weight (8.25 kg) then Nendran (9.15 kg), DesiMalbhog (13.11kg). Besides the cultivars performance, bunch weight of individual cultivar was influence by time of flowering (Singh, 1976), number of functional leaves (Satyanarayana, 1985) and by soil cover (Bhattacharyya and Madhava Rao, 1985). Similar type of work done by Bauri *et al.* (2016) and found that

Table 1: Growth parameter of AAB genomic group of banana in Gangetic alluvial zone of West Bengal

Genotype	Height at shooting (m)	Girth at shooting (cm)	Leaves plant^{-1} at shooting	Days to shooting	Days to bunch harvest	Crop duration (days)
1. Desi Malbhog	2.84	62.20	9.90	300.50	95.50	396.00
2. Sabri	2.79	63.40	12.20	255.00	90.70	345.70
3. Martanman	2.78	69.50	14.30	288.00	96.40	384.40
4. Poovan	2.76	63.30	13.40	255.20	100.00	355.20
5. Matta Poovan	2.98	58.80	12.70	230.50	108.50	339.00
6. Champa clone I	2.65	56.80	11.60	300.00	107.30	407.30
7. Champa clone II	2.68	61.30	10.40	315.30	93.00	408.30
8. Champa clone III	2.79	59.40	11.60	335.30	91.50	426.80
9. Amritpani	2.69	58.20	13.40	314.00	92.00	406.00
10. Alpan	3.19	83.10	11.70	350.70	102.00	452.70
11. Alpan-Manohar	3.10	73.70	12.60	348.00	99.20	447.2
12. Dudhsagar	3.00	72.30	13.30	277.00	100.00	377.00
13. Krishna- Vazhai	2.64	60.10	14.10	270.00	100.00	370.00
14. Kalibhog	3.25	83.10	12.30	335.00	115.00	450.00
15. Nendran	2.66	59.70	10.10	404.20	102.50	506.700
16. Hill Banana	2.95	52.20	12.20	230.10	107.20	337.30
17. Chang Monoa	3.28	76.70	10.80	334.00	105.20	439.20
18. Manohar	2.80	70.50	13.60	338.00	112.20	450.20
19. Martaman clone III	3.12	62.70	14.20	306.50	97.00	403.50
S Em(±)	0.10	2.22	0.53	8.75	2.26	8.55
LSD (0.05)	0.21	6.23	1.13	26.21	6.12	22.25

Table 2: Yield of AAB genomic group of banana in Gangetic alluvial zone of West Bengal

Genotype	Bunch weight (kg)	Yield (ton ha^{-1})	Hands bunch^{-1}	Fingers bunch^{-1}
1. Desi Malbhog	13.11	26.22	7.00	97.55
2. Sabri	14.94	29.90	8.79	115.50
3. Martanman	16.35	32.37	8.10	130.40
4. Poovan	16.17	32.34	14.15	200.40
5. MattaPoovan	15.28	30.56	13.30	216.30
6. Champa clone I	14.75	29.50	17.20	240.30
7. Champa clone II	16.35	32.70	15.35	210.20
8. Champa clone III	16.55	33.10	15.00	218.30
9. Amritpani	12.36	24.72	7.96	113.60
10. Alpan	14.47	28.94	12.15	201.50
11. Alpan-Manohar	18.65	37.30	9.97	150.70
12. Dudhsagar	22.12	44.24	10.10	136.40
13. Krishna- Vazhai	14.35	28.70	8.62	91.60
14. Kalibhog	13.42	26.84	8.93	99.30
15. Nendran	9.15	18.30	8.80	60.10
16. Hill Banana	8.25	16.50	8.50	98.40
17. Chang Monoa	14.17	28.28	10.92	81.30
18. Manohar	17.16	34.32	10.55	137.70
19. Martaman clone III	16.65	33.30	9.24	124.90
S Em(±)	0.95	1.56	1.34	9.75
LSD (0.05)	2.45	4.36	3.34	29.2

Table 3:Fruit and quality characteristics of AAB genomic group of banana in Gangetic alluvial zone of West Bengal

Genotype		Finger weight (g)	Finger length (cm)	Finger girth (cm)	Peel:pulp ratio	TSS (^{0} Brix)
1.	Desi Malbhog	127.50	6.20	5.12	2.85	22.9
2.	Sabri	124.40	7.50	5.56	2.35	24.5
3.	Martanman	130.50	7.98	6.43	2.15	24.7
4.	Poovan	77.20	6.40	7.42	2.65	21.4
5.	Matta Poovan	68.20	6.00	7.15	2.74	22.2
6.	Champa clone I	55.40	5.30	4.33	2.98	23.5
7.	Champa clone II	60.50	5.54	4.50	2.77	22.8
8.	Champa clone III	69.40	6.15	5.30	2.56	23.7
9.	Amritpani	110.30	6.90	5.56	2.11	21.3
10.	Alpan	72.40	6.90	5.62	1.90	19.1
11.	Alpan-Manohar	120.10	7.10	6.45	1.98	22.7
12.	Dudhsagar	160.30	7.60	6.18	2.00	21.6
13.	Krishna- Vazhai	152.20	6.10	5.12	1.78	22.3
14.	Kalibhog	127.30	6.85	5.00	1.88	22.4
15.	Nendran	125.40	7.80	6.80	1.80	22.7
16.	Hill Banana	58.00	6.90	5.74	1.70	23.6
17.	Chang Monoa	166.30	6.80	5.45	2.90	22.4
18.	Manohar	130.40	6.90	5.93	2.22	21.1
19.	Martaman clone III	120.90	7.00	6.53	2.23	24.2
	SEm(±)	**8.58**	**0.46**	**1.34**	**0.45**	**0.07**
	LSD (0.05)	**23.16**	**1.15**	**1.12**	NS	**0.19**

Dudhsagar produced maximum bunch weight. The maximum hands per bunch (17.20) was found in Champa clone I and followed by Champa clone II (15.35), whereas minimum hands par bunch (7) was observed in DeshiMalbhog variety. Fingers per bunch (240.30) were recorded highest in Champa Clone I followed by Champa Clone-III (218.30), MattaPoovan (216.30), Champa Clone III (210.20), Green Bombay variety (104.8). The minimum fingers per bunch (60.1) were recorded in Nendran variety and this was statistically similar with (81.3) variety Chang Monoa. Yield was recorded highest in Dudhsagar (44.24 ton ha^{-1}) followed by Alpan-Manohar (37.3 ton ha^{-1}), Champa clone III (33.10 ton ha^{-1}), Champa Clone II (32.7 ton ha^{-1}), Poovan (32.34 ton ha^{-1}) whereas minimum yield was recorded in Hill Banana (16.50 ton ha^{-1}), Nendran (18.30 ton ha^{-1}), DesiMalbhog (26.22ton ha^{-1}). Nofal and Rezk (2021) reported that the yield of banana based on several factors such as the environmental conditions, represented in high or low temperature, air humidity and wind, in addition to the soil factor and genotypic character. Shira *et al*. (2012) found that the bunch weight of Martaman banana was 16.21kg, these results were in agreement with the present study.These results were in accordance with the result of Meghwal *et al*. (2021) and Shira *et al*. (2012).

Fruit and quality characteristics

Dudhsagar variety was produced maximum finger weight (160.3 g) and this variety was statistically at par with Krishna Vazhai (152.20 g), Kalibhog (127.30g), Nendran (125.40g) while Champa clone I produced minimum finger weight (55.40g) then Hill Banana (58g), Champa clone II (60.50g), Champa clone III (69.40 g) (Table 3). Similar type of work done by Bauri *et al.* (2016). It was found that Martaman variety produced maximum finger length (7.98 cm) and this was statistically at par in case of Nendran (7.80cm), Dudhsagar (7.60cm), Alpan (7.10cm). While MattaPoovan showed a minimum finger length (6 cm) and this was statistically at par with Krishna- Vazhai (6.10cm), Champa clone III (6.15cm) Krishna-Vazhai (6.10 cm) DesiMalbhog (6.20cm). Among the cultivars evaluated in the genomic group AAB, maximum finger girth (7.42 cm) was observed in Poovan and it was statistically at par with MattaPoovan (7.15cm) Nendran (6.80 cm) Alpan-Manohar (6.45cm) variety whereas minimum finger girth was recorded in Champa Clone I (4.33cm) Champa Clone III (4.50 cm), Krishna-Vazhai (5.12cm) at maturity. Among the cultivars evaluated peel: pulp ratio was found highest in Champa Clone (2.98), followed by Desi Malbhog (2.85), Poovan (2.78),

Chang Monoa (2.77), Matta Poovan (2.74) whereas minimum peel:pulp ratio was found in Hill Banana (1.70), it is as per statistically with Krishna Vazhai (1.78), Nendran (1.80), Kalibhog (1.88). According to Dadzie and Orchard (1997), Forster *et al.* (2003) and Muchui *et al*. (2010) fruit pulp: peel ratio is the indicator of a more edible portion per finger. Martaman variety recorded highest TSS (24.7 ^{0}Brix) followed by Sabari (24.5^{0}Brix), Martaman Clone III (24.2Ú Brix), Hill Banana (23.6^{0}Brix). Whereas minimum TSS was recorded in Alpan (19.1^{0}Brix) variety, Manohar (21.1^{0}Brix), Amritpani (21.3^{0}Brix). Dhanyasree *et al*. (2019) worked on quality parameter and also found similar result that Martaman variety produced high T.S.S. Meghwal *et al*. (2021) found that maximum TSS content of Nendran was 26.23^o Brix.The results for finger weight, finger length, finger girth, peel:pulp ratio and TSS of Martaman banana were similar with the reports of Shira *et al*. (2012).

CONCLUSION

In AAB genomic group maximum crop duration (506 days) was recorded in Nendran and minimum (337 days) was observed in Hill banana. Nendran banana is most suitable for its best chip making quality due to high starch content, farmers can cultivate this for table as well as cooking purpose. Kalibhog recorded maximum pseudostem height (3.25m), whereas maximum pseudostem girth was found in Alpan (83.10 cm) and Martaman variety produced the highest leaves per plant (14.30) at shooting. Martamancan be considered as one of the mostchoiceable cultivars among the banana growers due to its attractive yellow colour, medium durationand high market demand andless susceptible to biotic and abiotic stress. Dudhsagar produced a maximum bunch weight of 22.12kg followed by AlpanMahnar (18.65kg) while the minimum bunch weight (8.25kg) was recorded in Hill banana. Maximum Hands/bunch (17.20) as well as maximum finger per bunch (240.30) produced by Champa Clone I while minimum fingers recorded in Nendran (60.1) variety. Finger weight was highest (166.30g) in Dudhsagar and lowest (55.40g) in Champa Clone–I. Champa can be cultivated widely becauseof its good keeping quality, hardy, suitable for ratooning and comparatively tolerant to disease and pests. Martaman recorded maximun TSS (24.70^0 Brix) followed by Sabri (24.50^0 Brix). Considering all the aspects the cultivars Dudhsagar, Martaman&Champa may be recommended for cultivation in the Gangetic plains of West Bengal.

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REFERENCES

Adepoju, O. T., Sunday, B. E. and Folaranmi, O. A. 2012. Nutrient composition and contribution of plantain (*Musa paradisiacea*) products to dietary diversity of Nigerian consumers. *Afr. J. Biotechnol.*,**11**(71), 13601-13605.

Bauri, F. K., Avani, P., Sarkar, S. K., Bandyopadhyay, B., Misra, D. K., Debnath, S. and Dey, K. 2016. Ex-situ conservation and performance of genetic resources of bananain New Alluvial Zone of West Bengal. *J. Crop and Weed.*, **12**(3):55-66.

Bhattacharyya, R.K. and Rao, V.M. 1985. Water requirement, crop coefficient and water-use efficiency of 'Robusta'banana under different soil covers and soil moisture regimes. *Sci. Hortic.*, **25**(3): 263-269.

Chakraborty, B.K. and Madhava Rao, V.K. 1980. Influence of planting season on certain growth and morphological characters of banana. Proc. Nat. Sem. on Banana Production Tech. Tamil Nadu Agricultural University, Coimbatore, pp. 73-78.

Chamling, N. and Bhowmick, N. 2021. Effect of secondary hardening media on the performance of in-vitro raised banana plantlets cv. Grand Naine. *J. Crop and Weed.*,**17**(1): 93-98.

Dadzie, B.K. and Orchard, J.E. 1997. Routine Post-Harvest Screening of banana/Plantain Hybrids: Criteria and Methods. INIBAP Technical Guidelines, IPGRI, Montpellier, pp. 32-37.

Davey, M.W., Gudimella, R., Harikrishna, J. A., Sin, L. W., Khalid, N. and Keulemans, J. 2013. A draft Musa balbisiana genome sequence for molecular genetics in polyploid, inter-and intra-specific Musa hybrids. *BMC genomics*, **14**:1-20.

Dhanyasree, K., Sobhana, S., Suma, A. and Pushpalatha, P.B. 2019. Evaluation of clones of banana Musa spp. 'Rasthali' (AAB group). *J. Trop. Agric.*, **57**(1): 35-39

Ditta, M., Waalwijk, C., Joseph, S., Dievart, A., Jaillon, O., Leclercq, J., Argout, X., Lyons, E., Almeida, A., Jeridi, M., Dolezel, J., Roux, N., Risterucci, A. M., Weissenbach, J., Ruiz, M., Glaszmann, C., Quetier, F., Yahiaoui, N. and Wincker, P. 2012. The banana (*Musa acuminata*) genome and evolution of monocotyledonous plants. *Nature.*, **488** (7410): 213-217.

Forster, M., Elena, R.R., Jacinto, D.M. and Carlos, D.R. 2003. Distribution of nutrients in edible banana pulp. *Food Tech. Biotech.*, **41**(2): 167-171.

Meghwal, M. L., Jyothi, M. L., Pushpalatha, P. B. and Bhaskar, J. 2021. Yield and fruit quality of banana Musa (AAB) Nendran as influenced by nutrient sources. *Int. J. bio-resour. stress manag.* **12**(2), 131-136.

Muchui, M.N., Njoroge, C.K., Kahangi, E.M. and Onyango, C.A. 2010. Determination of maturity indices of tissue cultured bananas (*Musa* spp.) 'Williams' and 'Grande Naine'. *Acta Hort.*, **879**: 425–430.

Nofal, O. A. and Rezk, A. I. 2021. Some factors affecting the yield and quality of banana: A Review. *Sci. Arch.*, **2**: 207-2011.

Panse, V.G. and Sukhatme, P.V. 1954. Statistical methods for agricultural workers. Indian Council of Agricultural Research, New Delhi (India).

Robinson, J.C., Anderson, T. and Eckstein, K. 1992. The influence of functional leaf removal at flower emergence on components of yield and photosynthetic compensation in banana. *J. of Hort. Sci*., **67**(3): 403-410.

Roy, O. S., Bantawa, P., Ghosh, S. K., da Silva, J. T., Ghosh, P. D. and Mondal, T. K. 2010. Micropropagation and field performance of 'Malbhog' (*Musa paradisiaca*, AAB group): a popular banana cultivar with high keeping quality of North East India. *Tree For. sci. biotech.*, **4**(1), 52-58.

Satyanarayana, M. 1985. Effect of number of functional leaves on growth and yield of Basrai banana. *Madras Agric. J.*,**75**: 532-533.

Shira, V. D., Bauri, F. K., Sarkar, S. K. and Uchoi, J. 2012. Bunch management technique for improving yield and quality of Martaman (AAB) banana.*Plant Arch.*,**12**:875-878

Singh, R.K. 1976. Time of shooting are related to yield of banana varieties 'Alpan and Malbhog'. *Proc. Bihar Acad. Agric. Sci.*,**24**: 39-44.

Sora, S. A. and JibatGuji, M. 2023. Evaluation of Banana (*Musa*Spps.) for Growth, Yield, and Disease Reaction at Teppi, Southwestern Ethiopia. *Int. J. Fruit Sci.*,**23**(1), 62-69.

Wang, Z., Miao, H., Liu, J., Xu, B., Yao, X., Xu, C., ... and Jin, Z. 2019. *Musa balbisiana* genome reveals subgenome evolution and functional divergence. *Nat. plants*, **5**(8), 810-821.

Yadav, A. 2021. Banana (*Musa acuminata*): Most popular and common Indian plant with multiple pharmacological potentials. *World J. Biol. Pharm. Health Sci*., **7**(1), 036-044.

Zhan, N., Kuang, M., He, W., Deng, G., Liu, S., Li, C., ... and Sheng, O. 2022. Evaluation of Resistance of Banana Genotypes with AAB Genome to Fusarium Wilt Tropical Race 4 in China. *Journal of Fungi*, **8**(12), 1274.