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Nayak PK
Department of Fruit Science and Horticulture Technology, College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

Patel MK
Department of Fruit Science and Horticulture Technology, College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

Panda CM
Department of Fruit Science and Horticulture Technology, College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

Swain S
Department of Fruit Science and Horticulture Technology, College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

Corresponding Author:
Nayak PK
Department of Fruit Science and Horticulture Technology, College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

Yield performance of commercial banana cultivars propagated through different methods

Nayak PK, Patel MK, Panda CM and Swain S

Abstract
An experiment entitled "Yield performance of commercial banana cultivars propagated through different methods" was carried out at the field of the AICRP on Fruits (Banana), at Horticultural Research Station, Orissa University of Agriculture and Technology (OUAT), Bhubaneswar during the year 2017-18. The experiment comprised of twelve (12) treatments replicated thrice and was laid out in a Randomized block design. The 4 varieties of banana *viz.*, Champa (AAB), Bantala (ABB), Patkapura (AAB) and Grand Naine (AAA) together constitute 12 treatments using 3 different propagation methods (Macro propagation, Micropropagation and Sucker propagation). The standard recommended packages of practices were followed in each treatment comprising of 10 plants. Observations in respect to reproductive character of banana were analysed statistically and it will justified that Grand naine micro propagation showed promising with respect to Number of fingers per bunch, Number of hand per bunch, Hand weight, Bunch weight and Yield. Whereas, number of fingers per hand and highest finger weight was found in Champa micro propagation and Bantala macro propagation respectively.

Keywords: Banana, yield, macro propagation, micropropagation, sucker, weight

Introduction
Banana has emerged as one of the important fruit crops, which is easily available to common man. It is predicted that with ever-increasing demand, 60 million tonnes of banana will be needed to meet the domestic demand in 2050. 26 out of 29 Indian states grow bananas. Today, banana is cultivated in more than 130 countries across the world in 5.00 million hectare and yielding 103.63 million tonnes of banana and plantain (FAO, 2013). India is the largest producer of banana in the world with 29.7 million tonnes from an area of 0.88 million hectares with a productivity of 37 MT/ha. Although India accounts for only 15.5% in area, its contribution in the world's production is 25.58%. Therefore, necessity in production of good quality and disease free planting materials sprang up in present day horticulture to cope up with its extension of area. The traditional practice of asexual propagation from suckers and macro propagation from cut and sprouted corms maintains a genetic stability but limits the scope for pest & disease-free mass multiplication and constant production of planting materials. These precipitated the idea of utilising the totipotency of banana and multiply it *en masse* from the meristematic tissues under *in vitro* condition. The field evaluation of yield performance of such planting materials along with suckers and macro propagated plantlets lack concrete information for recommending the practice to be followed by the growers. Hence, this research has been taken with the following crystal clear objectives such asto study the yield performance of banana plantlets propagated through different methods.

Materials and Methods
An experiment entitled "Yield performance of banana plantlets propagated through different methods" was carried out at the field of the AICRP on Fruits (Banana), at Horticultural Research Station, Orissa University of Agriculture and Technology (OUAT), Bhubaneswar during the year 2017-18. The experiment comprised of twelve (12) treatments replicated thrice and was laid out in a Randomized block design. The 4 varieties of banana *viz.*, Champa (AAB), Bantala (ABB), Patkapura (AAB) and Grand Naine (AAA) together constitute 12 treatments using 3 different propagation methods (Macro propagation, Micropropagation and Sucker propagation). The standard recommended packages of practices were followed in each treatment comprising of 10 plants.
The number of functional fingers per bunch was counted manually and the average number of fingers in each treatment was recorded. Number of hands per bunch was obtained by counting

the number of hands in each bunch and accordingly, average number of hands in each treatment was recorded. The average number of fingers per hand was calculated by dividing the average number of fingers per bunch by average number of hands per bunch. The Individual bunch weight was determined by weighing the bunch on a balance immediately after harvest. All full developed hands having only functional fingers were weighed and the values were averaged to record the observations. Weight of ten fingers was recorded from second hand of the bunch of each variety and the weight was taken with electrical balance and expressed in grams. Average of bunch weight of selected plants in each treatment multiplied by 80 per cent of plant population per hectare was computed and expressed in a tabular form.

Results and Discussion

The pseudostem of banana bears an inflorescence terminally which is an once-in-a-lifecycle event of the plant, that we visualize above the ground but in the underground the actual stem secludes itself concealing it's intrinsic perenniality which is hard to experience from the pseudostem having only one year of gestation period. The yield attributing characters which are mostly genetically determined, decides the economic yield of the crop. In nutritionally poor soils the growth and development of the pseudostem is not adequate producing smaller bunch size with less number of fingers. Hence the number of hands in a bunch and number of fingers in a hand together constitute the total bunch weight.

Bantala fingers (140.337g) were heaviest followed by Grand Naine fingers (136.300g), Champa fingers had the minimum weight (54.340g).The number of fingers per bunch were highest in Grand Naine (264.72) followed by Champa (264.44) which were at par with each other and the number of fingers per hand was highest in Champa (18.20) followed by Grand Naine (15.81) while the number of hands per bunch was highest in Grand Naine (16.94) followed by Champa (14.70). This indicates that both of them are desired genotypes, the culinary types Bantala is with less number of fingers per bunch (143.42) as well as less number of hands per bunch (11.52) which together constitute less number of fingers per hand (12.48). The individual finger weight and the corresponding hand weight together contribute towards the bunch weight as well as final yield. Accordingly the hand weight was highest in Grand Naine genotype (2.155Kg) along with the bunch weight (36.082 Kg) followed by Bantala (hand weight was 1.915Kg and bunch weight was 23.349 Kg). Hence the per hectare yield was highest in Grand Naine (72.164 t/ha) followed by Bantala (46.698 t/ha) and the Patkapura (22.742 t/ha) being the lowest. The method of propagation appears to have a very little effect on the yield and other yield attributing characters indicating that it is genetically controlled trait. This corroborates the finding of Bhanusree *et al.* (2015) [6], Rashed (2003), Baiyeri and Aba (2005) [4], Gitonga *et al.* (2010) [7], Sajith *et al. (*2014). Teaolia *et al* (1970) [15] observed that bunch yield was strongly correlated with plant girth and its contribution to variation in yield, which may be the reason for Grand Naine producing highest yield. The significant variation, observed in conventional sucker derived plants, may be dueto uneven selection of suckers used for planting i.e. uneven age of suckers and weight of rhizome. In general, it is always said that micro-propagatedbanana plants establish more quickly, grow more vigorously, and yields high and with more uniform harvesting period. However, some variation noticed within the plants of same varieties propagated by tissue culture might be due to selection of different suckers or clones for micro propagation and age of hardened plant taken for planting. The result are in agreement with the finding of Rosamma and Namboodri (1990) [13].

Table 1: Yield and yield attributing characters

Treatments	No of fingers / bunch	No of fingers / hand	No of hands /Bunch	Finger weight(g)	Hand weight(Kg)	Bunch weight(Kg)	Yield (t/ ha)
T_1- Champa (M)	248.03	17.50	14.35	55.420	0.970	13.746	27.492
T_2- Champa (m)	264.44	18.20	14.70	56.007	1.019	14.810	29.620
T_3- Champa (S)	232.20	17.20	13.68	54.340	0.935	12.618	25.236
T_4- Bantala (M)	143.42	12.48	11.74	140.337	1.751	20.126	40.252
T_5- Bantala (m)	168.30	13.80	12.42	138.740	1.915	23.349	46.698
T_6- Bantala (S)	144.36	12.80	11.52	136.407	1.746	19.691	39.382
T_7- Patkapura (M)	154.08	12.80	12.28	78.790	1.009	12.140	24.280
T_8- Patkapura (m)	174.97	13.50	13.19	79.300	1.071	13.875	27.750
T_9- Patkapura (S)	149.03	12.50	12.17	76.300	0.954	11.371	22.742
T_{10}- Grand Naine (M)	241.36	15.09	16.20	136.000	2.052	32.825	65.650
T_{11}- Grand Naine (m)	264.72	15.81	16.94	136.300	2.155	36.082	72.164
T_{12}- Grand Naine (S)	227.79	14.81	15.59	133.300	1.974	30.364	60.728
SEM(±)	7.23	0.40	0.31	2.811	0.056	0.807	1.615
CD (0.05)	21.33	1.18	0.91	8.298	0.166	2.383	4.767

Conclusion

The results revealed that none of the genotypes were found superior for all traits studied. However among the micropropagated type, performance of Grand Naine was better as compared to other genotype with regards to the reproductive characters along with the yield and yield attributing traits like number of fingers/bunch (264.72), number of fingers/hand (15.81), number of hands/bunch (16.94), finger weight (136.300g), hand weight (2.155kg), bunch weight (36.082Kg), yield (72.164t/ha). Though cultivar Bantal produced fingers at par in weight with Grand Naine (140.337g). The yield was lesser i.e.168.30/bunch, although Champa produced very high number of fingers per hand (18.20) but the bunch weight (14.810Kg) was less due to small sized fingers, despite having high market value cultivar Patkapura yielded less and took maximum time for shooting. Hence micropropagated Grand Naine cultivar is an acceptable genotype under the coastal agro-climactic conditions of Odisha with early bunching habits, dwarfing habits. Among the different propagation methods micro proagationis the best method with respect to yield characters along with mass multiplication at a faster rate, hence it can serve as a lucrative

method for growers.

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