



Research Article

EVALUATION OF GINGER (*Zingiber officinale* Rosc.) GERmplasm FOR ITS GROWTH AND YIELD IN GANGETIC ALLUVIAL PLAINS OF WEST BENGAL

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Abstract- The experiment was conducted to evaluate the Ginger (*Zingiber officinale* Rosc.) germplasm for its growth and yield in Gangetic alluvial plains of West Bengal at Horticultural Research Station, Mondouri, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal during 2014-15 and 2015-16. The design adopted was Randomized Block Design having 3 replications with 16 treatments of ginger germplasm namely, T₁-Athira, T₂-Karthika, T₃-Aswathy, T₄-Acc-65, T₅-Acc-219, T₆-GCP-49, T₇-Acc-91, T₈-Acc-701, T₉-Acc-723, T₁₀-Acc-239, T₁₁-Acc-87, T₁₂-Acc-713, T₁₃-Acc-278, T₁₄-Acc-702, T₁₅-Acc-247 and T₁₆-Gorubathan (control.). The investigation revealed that the most promising germplasm was T₅-Acc-219 which showed best results for growth and yield of ginger as it produced maximum in growth parameter like number of leaves per tiller (20.07) and as well as yield attributes like length of fingers (8.41 cm), girth of fingers (3.11 cm), number of fingers per clump (18.46), length of clump (20.65 cm), breadth of clump (9.88 cm), yield per plant (233.38 gm) and projected yield (18.32 t/ha). But growth parameters like plant height (57.69 cm) and number of tillers per clump (15.87) was found maximum with T₁₆-Gorubathan (control.). Therefore, the results led to a conclusion that the germplasm T₅-Acc-219 was found to be the most suitable variety performed better for its growth and rhizome yield attributing characters under Gangetic alluvial plains of West Bengal.

Keywords- Germplasm, Ginger, Growth and yield evaluation.

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Introduction

Ginger (*Zingiber officinale* Rosc.) is one of the earliest known oriental spices and is being cultivated in India for underground modified stem called rhizomes which is used both as fresh vegetable and as a dried spice, since time immemorial. Ginger is obtained from the rhizomes of *Zingiber officinale* Rosc., which belongs to the family Zingiberaceae. It is mainly grown in Darjeeling, Kalimpong, Nadia, Bhagwanpur areas of West Bengal. Ginger is used as carminative, diuretic and expectorant. It is effective against migraine headache [1] and diarrhoea [2]. It has so many medicinal properties for treatment of different diseases like atherosclerosis, heart disease, chemotherapy support, morning sickness, motion sickness, nausea and vomiting following surgery, rheumatoid arthritis, belching, laryngitis, constipation, incontinence, flatulence, colic, spasms, fever, eye diseases, Asthma, colds and cough. It is also used in veterinary medicines. Due to pleasant, pungent and spicy aroma ginger is used in the manufacture of a number of food products like ginger bread, confectionary, curry powders, certain curried meats, table sauces, pickle and in manufacturing of soft drinks like cordials, ginger cocktail, carbonated drinks, etc. It is also used in alcoholic beverages like ginger brandy, ginger wine and ginger beer etc. In spite of immense scope and possibility for the development of this crop in West Bengal, very little attempt has so far been made to utilize the agro-ecological conditions of the state ranging from sea-coast to an altitude of about 12,000 ft. Commercial cultivation of ginger is mainly restricted in the district of Darjeeling though it can be successfully cultivated in large scale in the plains of West Bengal also where there is some irrigation facilities. The commercial ginger cultivation in the plains of West Bengal is

restricted mainly due to insufficient information's on improved agro-techniques. Keeping these in view, the present investigation was undertaken to find out the most suitable variety/varieties performing better towards growth, rhizome yield attributing characters under Gangetic alluvial plains of West Bengal.

Materials and Methods

The experiment was conducted at Horticultural Research Station, Mondouri, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal conducted during 2014-15 and 2015-16 in the month of May to March. The germplasm under evaluation were T₁-Athira, T₂-Karthika, T₃-Aswathy, T₄-Acc-65, T₅-Acc-219, T₆-GCP-49, T₇-Acc-91, T₈-Acc-701, T₉-Acc-723, T₁₀-Acc-239, T₁₁-Acc-87, T₁₂-Acc-713, T₁₃-Acc-278, T₁₄-Acc-702, T₁₅-Acc-247 and T₁₆-Gorubathan (control.). The experiment was laid out in Randomized Block Design with three replications. The entire experiment field was leveled properly and was divided into three blocks and each block was divided into 16 plots. Raised bed of 3 x 1 m² with a spacing of 30 cm x 25 cm were planted. Well rotten Farm Yard manure (FYM) @ 30 tones/hectare and Neem Cake @ 2 tones/hectare were applied by broadcasting and mixed thoroughly at the time of land preparation. The inorganic fertilizers i.e., Nitrogen @ 80 kg/ha, Phosphorous @ 50 kg/ha and Potassium @ 60 kg/ha were also applied following proper package of practices. Observations were recorded on growth parameters like (Plant height, number of leaves per tiller and number of tillers per clump) and rhizome yield parameters like (length of fingers, girth of fingers, number of fingers per clump, length of clump, breadth of clump, yield per plant and projected yield/ha). The data collected from the field

were subjected to statistical analysis to the randomized block design by following procedure laid out [3]. For determination of standard error of mean (S. Em.±) and the value of critical difference (C. D) between the treatment means as 5% level of significance [4].

Results and Discussion

The pooled result (2014-15 and 2015-16) of the experiment revealed that [Table-1] the growth parameters like maximum plant height was recorded with germplasm T₁₆-Gorubathan (control.) (57.69 cm) and it was minimum with T₉-Acc-723 (33.92 cm). A plant height of Mahima and Rejatha were 57.03 cm and 54.57 cm under southern west Bengal condition respectively [5]. The number of leaves per tiller ranged from 20.07 (T₅-Acc-219) to 12.02(T₉- Acc-723) among the different germplasm under this present experiment. The leaves number per tiller of the cultivar Varada, Mahima and Rejatha were (6.27, 8.26 and 12.60) respectively [6].Among the different germplasms under study, tiller number per clump varied

from 15.87 (T₁₆-Gorubathan) (control.) to 9.26 (T₂-Karthika). The tiller number per plant in some ginger cultivars where the maximum and minimum values were with 9.93 (Nadia) and 5.36 (Karakal) [7]. Further, the yield attributes like length of fingers per clump was recorded with germplasm T₅-Acc-219 (8.41 cm) and it was minimum with T₇-Acc-91 (4.47 cm). Girth of fingers was found maximum with T₅-Acc-219 of (3.11 cm) while the minimum girth was recorded with T₇-Acc-91 (1.25 cm). There was significant differences among the germplasm with regard to number of fingers per clump in which Maximum fingers per clump was produced by T₅-Acc-219 (18.46) while minimum was recorded in T₇-Acc-91 (6.45). The different ginger germplasm showed variation among themselves in respect to Length of clump like maximum was recorded with T₅-Acc-219 (20.65 cm) while minimum length of clump was recorded in T₇-Acc-91 (9.77 cm). It was also recorded that the highest length of clump with Sambuk local cv. (14.03 cm) and lowest with Himjiri (9.25 cm) under southern West Bengal condition [5].

Table-1 Growth and yield attributing characters of different germplasm of ginger

Treatments	Plant height (cm)	Number of leaves per tiller	Number of tillers per clump	Length of fingers (cm)	Girth of fingers (cm)	Number of fingers per clump	Length of clump (cm)	Breadth of clump (cm)	Yield per plant (gm)	Projected yield per hectare (t/ha)
T1- Athira	41.72	17.62	11.93	5.68	2.55	15.83	16.10	7.05	195.89	15.41
T2- Karthika	36.22	16.33	9.26	5.28	2.14	11.37	12.75	6.31	138.05	10.84
T3- Aswathy	37.91	18.26	11.57	5.57	2.33	12.76	13.72	6.51	154.44	12.13
T4- Acc-65	40.85	19.59	9.94	7.17	2.60	16.09	17.35	7.71	201.33	15.82
T5- Acc-219	46.78	20.07	11.35	8.41	3.11	18.46	20.65	9.88	233.38	18.32
T6 - GCP 49	38.25	13.61	11.39	5.41	1.65	8.48	11.39	5.86	105.81	8.31
T7- Acc-91	36.86	14.82	9.28	4.47	1.25	6.45	9.77	5.26	52.08	4.08
T8 - Acc-701	38.67	16.06	11.36	5.24	2.08	11.16	12.21	6.31	132.40	10.39
T9- Acc-723	33.92	12.02	9.76	4.64	1.60	6.76	11.47	5.40	60.81	4.77
T10- Acc-239	38.15	17.26	11.83	5.60	2.27	11.81	13.23	6.43	148.40	11.65
T11- Acc-87	38.93	14.10	12.74	5.76	2.38	15.65	14.44	7.13	191.82	15.08
T12- Acc-713	40.13	19.37	11.22	7.38	2.65	16.73	17.56	7.87	203.66	16.00
T13- Acc-278	40.58	18.83	14.05	5.23	2.36	15.59	15.67	7.74	190.32	14.97
T14- Acc-702	39.23	17.09	13.50	4.86	2.18	13.19	14.18	7.32	161.68	12.70
T15- Acc-247	39.62	19.33	13.30	5.52	2.15	12.67	14.15	7.17	159.31	12.52
T16-Gorubathan (control.)	57.69	18.57	15.87	8.12	2.71	17.93	18.35	8.49	214.77	16.88
S.Em±	3.18	1.49	0.69	0.46	0.27	1.35	1.05	0.43	16.76	0.93
C.D. @ 5%	9.21	4.31	1.99	1.35	0.80	3.92	3.03	1.25	48.43	2.71

Simultaneously, Maximum breadth of clump was recorded with T₅-Acc-219 (9.88 cm) and minimum was found with T₇-Acc-91 (5.26 cm). In the present field experiment the harvest was delayed as the germplasm were aimed for collection as seed rhizome. Among the sixteen germplasm the rhizome yield per plant was found maximum in T₅-Acc-219 (233.38gm) and minimum was recorded in T₇-Acc-91 (52.08 gm). The highest rhizome yield per plant in SG 646 (214 gm) under the mid-hill conditions of Himachal Pradesh and identified as substitute of Himjiri for fresh ginger production [8]. Projected yield of rhizome per hectare was also found maximum in T₅-Acc-219 (18.32 t/ha) and minimum in T₇-Acc-91 (4.08 t/ha). It was also reported that the rhizome yield per hectare was found maximum with Gorubathan (18.27 t/ha) and minimum in Mahima (6.53 t/ha) under Southern West Bengal condition [5]. The variation was mainly due to varying agro climatic condition and cultural practices followed.

Conclusion

The results led to a conclusion that for Gangetic alluvial plains of West Bengal T₅-Acc-219 showed better performance in almost all growth and yield attributing parameters following standard package of practices.

Application of research: It indicated that local cultivar is well acclimatized with the soil and climatic conditions of the state. The other improved cultivars possibly could not exhibit their fullest potential due to variation in soil and climatic conditions from the area of collection. This investigation was undertaken to find out the most suitable variety/varieties performing under Gangetic alluvial plains of

West Bengal for a just Horticultural Research Purpose of the State/University and further for the Documentation of Farmers benefits

Research Category: Spices and Plantation Crops

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Abbreviations

T: Treatment/s
@: at the rate of
Acc: Accessions
cv: Cultivar
cm: Centimeter
CD: Critical difference
SEm: Standard error mean
gm: Gram
etc: et cetera (= and the rest)
t/ha: tonnes per hectare
kg/ha: Kilogram per hectare
m: Metre
/: Per
%: Percentage
m²: metre square
ft: feet

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