

Evaluation of Ginger (*Zingiber officinale* Rosc.) Genotypes for Growth and Yield Attributes under Soppinabetta Ecosystem of Karnataka

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Abstract The experiment was conducted to assess ginger (*Zingiber officinale* Rosc.) genotypes for yield and quality at Sirsi (Karnataka). The experiment with 16 treatments was laid out in a randomized block design with two replications. Ginger genotypes namely IISR-Mahima, IISR-Varada, IISR-Rajatha, Suravi, Suprabha, Himagiri, Rio-de-Janeiro, Suruchi, Himachal, Karkal Local, Humanabad Local, Jorhat-1, Jorhat-2, Bidar-1, Bidar-2 and Shikaripura Local were selected for the study. A good amount of genetic variability has been reported among different varieties with regard to growth and yield parameters under different agro-climatic conditions. Hence present investigation was carried out to study the performance of ginger genotypes for yield and quality parameters under Soppinabetta ecosystem of Uttara Kannada. The investigation indicated Humanabad Local as the most promising genotype in terms of growth and yield. The growth attributes like plant height (53.25 cm), number of leaves (315) and leaf area index (20.19) and yield attributes like length of primary fingers (7.41 cm), length of secondary fingers (5.78 cm), rhizome yield

plant⁻¹ (360.20 g) were highest with Humanabad Local. The projected fresh yield was maximum (21.55 t ha⁻¹) in Humanabad Local and also reported maximum dry recovery (27.35%). It was concluded that the genotype Humanabad Local was performed better with respect to growth and yield attributes among the 16 genotypes used in the study.

Keywords Evaluation, Genotypes, Ginger, Yield, *Zingiber officinale*.

Introduction

Ginger, the rhizome of *Zingiber officinale* Rosc. is one of the most widely used spice of the family Zingiberaceae. India is the largest ginger producing country in the world and is cultivated in most of the Indian states. Ginger grown in different parts of the country varies considerably in its intrinsic physical and biochemical properties and its suitability for processing. The important quality parameters of ginger are its fiber, volatile oil and non-volatile ether extract. Association of plant character has always been helpful as a basis for selecting desired genotypes. Many varieties of ginger (*Zingiber officinale* Rosc.) are available in India which are region specific, varying in plant habit, yield and quality parameters. The performance of ginger grown in Soppinabetta ecosystem of Uttara Kannada district of Karnataka has shown an immense potential for its

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commercial cultivation in large area. However, the information on varieties suitable to this region is scanty and no systematic efforts were made to evaluate the improved ginger cultivars for their suitability to this region. Hence, the present investigation was undertaken to identify a suitable variety or varieties for Uttara kannada and surrounding districts of Karnataka for commercial cultivation during 2014-15, at college of Horticulture Sirsi, Uttarakanda district of coastal Karnataka. The experimental site was located at 14.26° North latitude and 74.5° East longitudes at an altitude of 619 meters above mean sea level. It receives an annual average rainfall of 2353 mm. The mean maximum temperature is 35.10°C (May) and mean minimum temperature is 15.50°C (January) and the relative humidity ranges from 64 to 93.80%.

Materials and Methods

The field experiment was conducted at Uttarakanda district of Karnataka during 2014-15. The trials were laid out in randomized block design (RBD) with two replications using sixteen genotypes of ginger namely IISR-Mahima, IISR-Varada, IISR-Rajatha,

Suravi, Subrabha, Himagiri, Rio-de-janeiro, Suruchi, Himachal, Karkal Local, Humanabad Local, Jorhat-1, Jorhat-2, Bidar-1, Bidar-2 and shikaripura Local were selected for the study. The entire experimental field was levelled properly and was divided into three blocks and each block was divided into 16 plots. Raised bed of 3 m length and 1 m width was prepared. The ginger rhizomes were planted in flat beds with a spacing of 30 cm × 20 cm. Farm yard manure (FYM) at 25 tonnes ha⁻¹ and vermicompost at 2 tonnes ha⁻¹ were applied by broadcasting. 100 kg N, 50 kg P₂O₅ and 50 kg K₂O were also applied following proper package of practices [1]. Observations were recorded on growth attributes growth and yield attributes were recorded. The data collected were subjected to statistical analysis. For determination of standard error of mean (SEM ±) and critical difference (C.D) between the treatment means at 5% level of significance, the statistical table formulated earlier [2] was referred.

Results and Discussion

Table 1 shows highly significant variations among the genotypes for growth attributes. Growth attributes

Table 1. Mean growth attributes in different ginger genotypes under Soppinabetta ecosystem. cm-centimeter %-per cent, CD-Critical difference @ 5% level of significance, CV-Coefficient of variation.

Sl. No.	Genotypes	Plant height (cm)	Number of leaves /plant	Number of tillers /plant	Leaf area index	Stem girth
1						3.66
2	Suprabha	36.85	138.50	11.20	5.72	3.55
3	IISR-Mahima	51.45	302.50	14.20	19.01	3.24
4	Karkala Local	50.45	156.50	12.20	7.12	3.43
5	Humnabad Local	53.25	315.00	16.00	20.19	3.56
6	Himagiri	39.35	151.50	12.25	5.10	3.42
7	IISR-Varada	38.45	149.00	12.80	5.60	3.32
8	Suravi	37.55	147.50	12.20	6.11	3.47
9	Shikaripura Local	41.95	162.50	10.20	5.85	3.36
10	Suruchi	38.25	162.00	14.10	5.29	3.17
11	Jorhat-1	35.45	138.00	8.20	5.06	3.64
12	Himachal	41.55	165.00	8.20	6.83	3.57
13	Rio-de-Janeiro	46.00	270.50	10.05	14.09	3.93
14	IISR-Rajatha	45.13	250.50	14.30	13.31	3.53
15	Bidar-1	39.75	191.00	11.20	7.14	3.36
16	Jorhat-2	39.65	215.00	9.80	6.73	3.29
	Bidar-2	35.95	175.00	13.30	6.76	0.09
	SEM±	2.51	22.19	1.17	0.87	0.27
	CD (<i>p</i> =0.05)	7.57	66.90	3.50	2.64	8.10
	CV (%)	10.48	16.23	16.76	14.14	

like plant height varied from 35.45 cm to 53.25 cm. Among the sixteen genotypes evaluated the genotype Humnabad Local recorded maximum plant height (53.25 cm) which was on par with genotype IISR-Mahima (51.45 cm), Karkala Local (50.45 cm) and the lowest plant height was observed in genotype Jorhat-1 (35.45 cm). With respect to number of functional leaves per plant the genotype Humanabad Local recorded maximum number of functional leaves (315.00) and which was on par with the genotypes IISR-Mahima (302.50), Rio-de-Janeiro (270.50) and IISR-Rajatha (250.50). The minimum number of leaves were recorded in case of Jorhat-1 (138.00). The number of tillers were maximum in genotype Humanabad Local (16.00), which was statistically on par with IISR-Rajatha (14.30), IISR-Mahima (14.20), Suruchi (14.10), Bidar-2 (13.30), IISR-Varada (12.80) whereas the minimum number of tillers was observed in Jorhat-1 (8.20). Maximum leaf area index was recorded in the genotype Humnabad Local of 20.19, which was on par with IISR-Mahima (19.01) and minimum was recorded in the genotype Jorhat-1 (5.06). The maximum girth of stem was observed in the genotype Humanabad Local (3.93 cm) which was at par with

IISR-Rajatha (3.85 cm), Suprabha (3.66 cm). The lowest stem girth was recorded in the genotype Jorhat-1 (3.17 cm). Data pertaining to the yield attributing characters like number of primary rhizome, number of secondary rhizome, fresh ginger yield per plant, fresh rhizome yield per hectare, and dry ginger recovery in per cent are presented in Table 2. The number of primary and secondary rhizome per plant differed significantly among the sixteen genotypes evaluated. Maximum number of primary rhizomes were recorded in genotype Humnabad Local (6.30) which was on par with IISR-Mahima (6.05) and Karkala Local (5.90) whereas, the minimum number of primary rhizomes was recorded in the Jorhat-1 (3.36). The number of secondary rhizomes per plant differed significantly among the genotypes. the maximum number of secondary rhizomes per plant was recorded in genotype Humanabad Local (24.50), which was statistically on par with IISR-Mahima (22.75). The minimum number of secondary rhizomes per plant was recorded in the genotype Jorhat-1 (18.83). The genotype Humnabad Local recorded the maximum yield per plant and yield per hectare (360.20 g and 21.55 t) respectively, which was on par with IISR-Mahima (325.40 g and 19.45

Table 2. Yield attributes in different ginger genotypes under Soppinabetta ecosystem. g-gram, t-ton, cm-centimetre, %-per cent, CD-Critical difference@5% level of significance, CV-Coefficient of variation.

Sl. No.	Genotypes	Number of primary rhizomes	Number of secondary rhizomes	Fresh yield per plant (g)	Fresh yield per hectare (t)	Dry recovery (%)
1	Suprabha	4.60	20.53	222.60	18.18	20.88
2	IISR-Mahima	6.05	22.75	325.40	19.45	25.10
3	Karkala Local	5.90	21.90	309.00	12.20	24.03
4	Humnabad Local	6.30	24.50	360.20	21.55	27.35
5	Himagiri	4.50	20.68	208.50	11.58	20.40
6	IISR-Varada	4.23	21.30	259.10	18.40	22.09
7	Suravi	3.80	20.80	298.20	17.33	22.51
8	Shikaripura Local	3.70	21.19	309.00	18.40	22.59
9	Suruchi	4.60	21.75	309.00	18.67	19.15
10	Jorhat-1	3.36	18.83	180.50	10.55	17.17
11	Himachal	4.60	21.05	244.95	18.53	21.32
12	Rio-de-Janeiro	4.40	20.78	199.70	18.70	24.80
13	IISR-Rajatha	4.70	20.40	251.85	18.58	20.07
14	Bidar-1	4.50	21.54	290.70	18.94	18.54
15	Jorhat-2	3.70	19.00	268.70	18.09	20.46
16	Bidar-2	4.20	20.10	317.50	18.69	20.35
	SEm±	0.49	0.86	12.12	0.71	1.52
	CD ($p=0.05$)	1.47	2.59	36.52	2.10	4.56
	CV (%)	15.08	12.52	12.85	10.03	11.13

t) respectively and the lowest was recorded in the genotype Jorhat-1 (180.50 g and 10.55t) respectively. The genotype Humnabad Local recorded the maximum dry recovery (27.35%) which was on par with the genotype IISR-Mahima (25.10%), Rio-de-Janeiro (24.80%) and Karkala Local (24.03%). The lowest dry recovery percentage was recorded in the genotype Jorhat-1 (17.17%).

The genotype Humnabad Local recorded maximum plant height 53.25 cm could be attributed to the genetic constituents of the genotypes with reaction to environment recorded maximum height. Similar results also reported with respect to plant height in a trial conducted under GLBC area of Belgaum district, Karnataka, where the same genotype recorded maximum plant height [3]. Genotype Humnabad Local recorded 315 number of leaves. Similar result also obtained by Kale that the genotype Humnabad Local recorded maximum number of leaves. The genotype Humnabad Local recorded higher number of tillers per plant (16.00). These results are comparable with maximum tillers per plant reported at Srikakulam district of Andhra Pradesh in cv Suprabha [4]. With respect to yield attributes the genotype Humnabad Local recorded maximum number primary and secondary rhizomes (6.30 and 24.50) respectively. Genotype Humnabad Local produced higher fresh rhizome yield per plant (360.20 gm) and yield per hectare (21.55 t). Such varietal variation in the different rhizome characters

grown under similar conditions has been reported earlier [3,5,6]. Highest recovery percentage of rhizome was recorded in the genotype Humnabad Local (27.35%). Such variation with respect to curing percentage was also reported earlier [6].

Conclusion

Among the different genotypes evaluated, the genotype Humnabad Local performed better with respect growth and yield parameters. Hence, it can be recommended for commercial cultivation in Sirsi and Uttara Kannada area of Karnataka.

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