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Genotypic Response For Dry Rhizome Recovery, Oleoresin Content And Fresh Rhizome Yield In Ginger Grown Under Shade Net

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Abstract:
The experiment was taken up to elicit the information on performance of different ginger (Zingiber officinale Rosc.) varieties under shade net condition. Eleven varieties of ginger were evaluated in RBD with three replications during kharif season of 2018-19 at College of Agriculture, Raichur, Karnataka. The dry rhizome recovery and oleoresin content of eleven varieties indicated significant variation. The genotype Humnabad local expressed significantly highest dry rhizome recovery of 26.47 per cent. Sirsi local with least dry rhizome recovery of 18.55 per cent was found to have lowest dry rhizome recovery among all the genotypes under study. Significantly higher oleoresin content was obtained with Rio-de-Janerio (9.33 %) followed by Humnabad local (8.11 %).

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I. Introduction:

Ginger is one of the most important and ancient spice crops in India, belongs to the family Zingiberaceae under the natural order Scitamineae. It is a tropical plant, believed to have originated in South East Asia probably India or China (Bailey, 1949). Ginger is an herbaceous perennial and rhizomatous spice crop containing volatile oil, fixed oil, pungent compounds, resins, starch, protein and minerals. Among the several components, 'alpha zingiberene' is the predominating component of essential oil. 'Gingerol' and 'Shagoal' are responsible for the characteristic pungency of the ginger rhizome. The refreshing aroma and the pungent taste make ginger an essential ingredient of food. Ginger powder is also an essential ingredient in varieties of masala or spice mixes. Ginger is used in several food articles viz., bread, biscuit, cake, pudding, soup and pickle. According to the Indian system of medicine i.e., Ayurveda, ginger rhizome is carminative and digestive. It is believed to be useful in treating dropsy, asthma, cough, diarrhoea, flatulence, nausea and vomiting.

India is the largest producer in the world and it plays an important role in earning foreign exchange for the country. In India, it is mainly grown in Assam, West Bengal, Maharashtra, Karnataka, Gujarat, Meghalaya, Andhra Pradesh and Tamil Nadu. Among these, Assam stands first with an area of 18,700 hectare and production of 1,66,500 metric tonnes. Karnataka occupies fourth place in the area (29.3 ha) and production (109.3 MT). Gujarat ranks first in the productivity (15,460 MT) (Anon., 2017).

Presently the cultivation of ginger in N-E Karnataka region is not to the expected level. As the crop is highly sensitive for high temperature its performance is poor in Raichur, Gulbarga, Bellary, Koppal and Yadgiri districts, where the temperature is high. However the farmers of Bidar district are happy with cultivation of ginger. Keeping these points in view and to come out with an alternative means of production of ginger, in regions of high temperature the cultivation of different cultivars of ginger was taken up under shade net conditions.

II. Material and Methods:

Eleven varieties of ginger *viz*., Rio-de-Janerio, IISR Mahima, Mahim 1, Mahim 2, Himachal, IISR Varada, Basavakalyan -1, Humnabad Local, Maran, Sirsi Local, IISR Rajetha were taken for the studies. The experimental site was located at Main Agriculture Research Station, Division of Horticulture, College of Agriculture, University of Agricultural Sciences, Raichur. The experiment was laid out in a Randomized Block Design with 3 replications in plot size of 7.5×1 m^2.1 Ginger rhizomes were planted on the beds at a spacing of 45 cm×30 cm. Before planting the rhizomes, they were dipped in solution containing, Streptocyclin (0.01%), Bavistin (2 g lit^{-1}) and Chloropyriphos (2 ml lit^{-1} of water). The soil was red sandy loam with good drainage and moderate water holding capacity. Before planting the experimental field was brought into fine tilth and planting was done in during last week of May. Fertilizers were applied as per recommendations (Anon., 2014). Randomly ten plants from each treatments were selected to record the observations. The crop was harvested after eight

months and the data was recorded. The data collected were subjected to statistical analysis by adopting the method given by Panse and Sukhatme (1985).

III. Results and Discussion

Dry rhizome recovery (%)

The results of dry rhizome recovery are presented in Table 1. The genotype Humnabad local expressed significantly highest dry rhizome recovery of 26.47 per cent. The genotypes Rio-de-Janerio (24.57 %), Mahima (23.27 %) and Mahim-1 (24.30 %) were found to have similar dry rhizome recovery percentage as that of Humnabad local. Hence they were found to be on par with Humnabad local. Sirsi local with least dry rhizome recovery of 18.55 per cent was found to have lowest dry rhizome recovery among all the genotypes under study. However, the dry rhizome recovery ranged between 8.55 (%) to 26.47 (%) in Humnabad local and Sirsi local. This range was found to be in agreement with the result deduced by earlier workers *i.e*., Chongtham *et al*. (2013) and Ravi *et al.* (2016).

Oleoresin content (%)

The oleoresin content is an important factor. The oleoresin of the ginger as exhibited by different genotypes has been presented in Table 1 and Fig. 1.

Significantly higher oleoresin content was obtained with Rio-de-Janerio (9.33 %) followed by Humnabad local (8.11 %). Both the genotypes were found to be on par with one another. The mean oleoresin of all the genotypes was found to be 5.98 per cent. The genotype Maran expressed 7.47 per cent of oleoresin content which was more than the mean value. None of the genotypes under the study were found to have significantly less oleoresin content. The high yielding Basavakalyan-1 and Maran genotypes did not have highest oleoresin content. It was observed that the genotypes with lower rhizome yield exhibited the higher oleoresin content. The earlier workers *i.e*., Kale (2001), Iwo *et al*. (2011), Kale *et al*. (2003), Deb and Suresh (2009) and Nileena *et al*. (2014) also have documented similar results.

IV. Conclusion:

It was observed that the genotypes Basavakalyan-1, Maran and Humnabad local produced higher fresh rhizome yield and comparatively lower dry rhizome recovery.

The high yielding genotypes Basavakalyan-1, Maran and Humnabad local were found to have moderate oleoresin content. The maximum oleoresin content was associated with Rio-de-Janerio. Rhizome yield of Rio-de-Janerio was moderate under shade net condition.

Table.1 Genotypic response of ginger on dry rhizome recovery, oleoresin content and fresh rhizome yield under shade net condition.

Genotypes	Dry rhizome recovery (%)	Oleoresin content (%)	Fresh rhizome yield (t ha^{-1})
Rio-de-Janerio	24.57	9.33	4.98
IISR Mahima	23.27	5.53	4.73
Mahim-1	24.30	5.50	5.81
Mahim-2	20.97	5.38	7.82
Himachal	19.38	4.38	4.15
IISR Varada	19.20	5.28	4.62
Basavakalyan-1	21.50	5.27	13.54
Humnabad local	26.47	8.11	7.83
Maran	22.83	7.47	8.39
Sirsi local	18.55	4.45	1.77
IISR Rejatha	21.76	5.11	3.12
Mean	**22.07**	**5.98**	**6.07**
S.Em ±	**1.17**	**0.55**	**0.64**
C.D. at 5 %	**3.46**	**1.63**	**1.88**

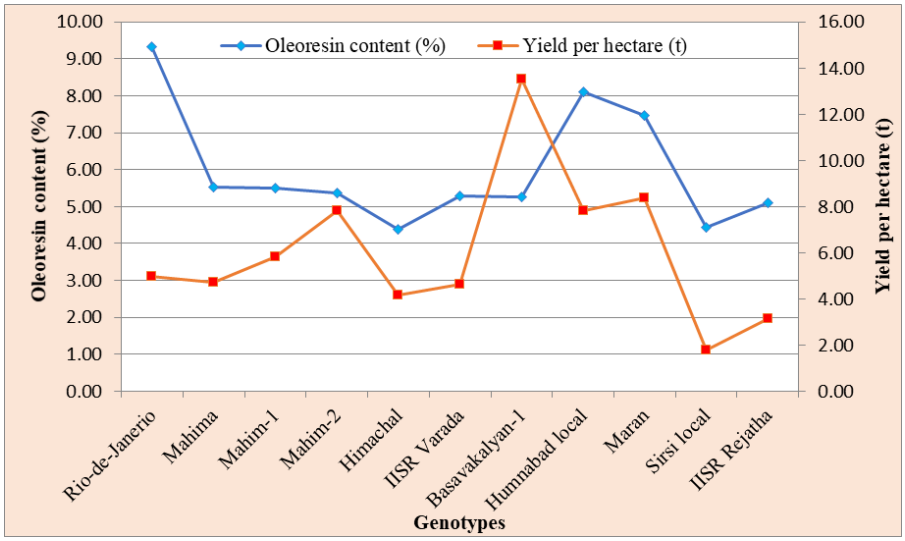

Fig. 1: Genotypic response of oleoresin content and ginger rhizome yield

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