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Correlation co-efficient studies on ginger (*Zingiber officinale* Rosc.) germplasm in Gangetic alluvial plains of West Bengal

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ABSTRACT

The experiment was conducted to study the "Correlation co-efficient studies on ginger (Zingiber officinale Rosc.) germplasm in Gangetic alluvial plains of West Bengal" at Horticultural Research Station, Mondouri, Bidhan Chandra Krishi Viswavidyalaya., Nadia, West Benagl during 2014-15 and 2015-16. The design adopted was Randomized Block Design having 3 replications with 16 treatments of ginger germplasm namely., Athira, Karthika, Aswathy, Acc-65, Acc-219, GCP-49, Acc-91, Acc-701, Acc-723, Acc-239, Acc-87, Acc-713, Acc-278, Acc-702, Acc-247 and Gorubathan (control.). The investigation revealed that the yield per clump showed a positive and highly significant correlation with plant height (0.9427), number of leaves (0.9091), number of tillers per clump (0.926), leaf length (0.9914), leaf breadth (0.9665), leaf area (0.776), length of fingers (0.65), girth of fingers (0.6139), number of fingers per clump (0.5968), length of clump (0.5338), breadth of clump (0.773), volume of clump (0.6488), oleoresin content (1.000) and dry recovery content(0.963). A positive correlation between yield and essential oil content (0.1056) was observed and it was not significant.

Keywords: Correlation, ginger, germplasm variability

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. India is the largest producer in the world and the annual production is about 8.55 lakh tonnes from an area of about 1.33 lakh hectares, contributing approximately 25 to 30 per cent of the world production (NHB, 2015). In West Bengal, it is grown in an area of about 11,500 hectares with an annual production of 25,000 tonnes of fresh rhizome (NHB, 2015). 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 (Mustafa and Srivastava, 1990) and diarrhoea (Huang *et al*, 1990). 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..

MATERIALS AND METHODS

A field trial on Ginger (*Zingiber officinale* Rosc.) was conducted at Horticultural Research Station, Mondouri, Faculty of Horticulture, BCKV, Nadia, West Bengal conducted during 2014-15 and 2015-16 in the month of May to March. The germplasm under evaluation were Athira, Karthika, Aswathy, Acc-65, Acc-219, GCP-49, Acc-91, Acc-701, Acc-723, Acc-239, Acc-87, Acc-713, Acc-278, Acc-702, Acc-247 and Gorubathan (control). The experiment was laid out in RBD with three replications and 16 treatments in a plot size of 3 x 1 m. The correlation studies of the experiment on the basis of two years pooled data have been summarized below.

RESULTS AND DISCUSION

The correlation co-efficient values were calculated among the growth, yield and quality attributing characters from the pooled data of the two consecutive years *i.e.* 2014-2015 and 2015-16.

The correlation data (Table 1) showed a positive and highly significant correlation was noticed between yield and plant height (0.9427), number of leaves (0.9091), number of tillers per clump (0.926), leaf length (0.9914), leaf breadth (0.9665), leaf area (0.776), length of fingers (0.65), girth of fingers (0.6139), number of fingers per clump (0.5968), length of clump (0.5338), breadth of clump (0.773), volume of clump (0.6488) and dry recovery content(0.963).A positive correlation between yield and essential oil content (0.1056) was observed and it was not significant. Pandey and Dobhal (1993) studied twenty-nine varieties from Assam, Meghalaya, Tripura and Nagaland were grown at Shillong during kharif. Plant height, number of fingers and yield per

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plant were positively correlated with each other and with most of the other traits.

Plant height was positive and significantly correlated with number of leaves (0.5104), number of tillers per clump (0.6679), leaf length (0.7594), leaf breadth (0.5621), leaf area (0.7392), length of fingers (0.775), girth of fingers (0.6269), number of fingers per clump (0.6876), length of clump (0.7185), breadth of clump (0.7261) and volume of clump (0.7333).Plant height was positively correlated but was not significant with essential oil content (0.4736). Further, oleoresin content (-0.2179) and dry recovery content (-0.0017) was found negatively correlated and non-significant.

Number of leaves were positive and significantly correlated with leaf length (0.5497), leaf area (0.5526), length of fingers (0.6414), girth of fingers (0.7715), number of fingers per clump (0.7632), length of clump (0.7688), breadth of clump (0.7673) and volume of clump (0.7475). Whereas, negative correlation was observed with oleoresin content (-0.1139) and it was not significant. Further, Number of tillers was positively and significantly correlated with leaf length (0.5971), leaf area (0.5373), and number of fingers per clump (0.5373). Whereas oleoresin content (-0.5897) was negatively correlated and was not significant.

Leaf length was positively and significantly correlated with leaf breadth (0.7041), leaf area (0.9489), number of fingers per clump (0.6406), breadth of clump (0.6429) and volume of clump (0.6473). Whereas, essential oil content (0.346) and dry recovery content (0.0329) was found positively correlated but not significant. Further, Leaf breadth exhibited positive and high significance with leaf area (0.8905), girth of fingers (0.6912), number of fingers per clump (0.6488), length of clump (0.7301), breadth of clump (0.6731) and volume of clump (0.6967). Leaf area was found positively and highly significant with almost all yield attributing characters like length of fingers (0.6387), girth of fingers (0.7009), number of fingers per clump (0.6928), length of clump (0.7077), breadth of clump (0.7073) and volume of clump (0.7229). Sasikumar *et al*. (1992) evaluated 100 accessions of ginger for plant height, leaf number, tiller number, length and width of leaf, days to maturity, dry recovery and rhizome yield/ plant. Plant height, leaf number, tiller number as well as length and width of leaves had positive significant association with rhizome yield.

Length of fingers were positive and significantly correlated with girth of fingers (0.8242), number of fingers per clump (0.7942), length of clump (0.8961), breadth of clump (0.8505) and volume of clump (0.8997). Whereas, girth of fingers was positively and significantly correlated with number of fingers per clump (0.96), length of clump (0.9465), breadth of clump (0.9107) and volume of clump (0.9637). Further, number of fingers per clump were found positively and significantly correlated with length of clump (0.9421), breadth of clump (0.9177) and volume of clump (0.9465).

Length of clump was positively and significantly correlated with breadth of clump (0.9635) and volume of clump (0.9788). Breadth of clump was highly significant with volume of clump (0.9776). Whereas, essential oil content (0.3229) and dry recovery content (0.2998) were positively correlated but was not significant. Further, volume of clump was positively correlated but was not significant with essential oil content (0.30) and dry recovery content (0.21).Whereas, volume of clump was negatively correlated and not significant with oleoresin content (-0.04). Essential oil content was positively correlated with oleoresin content (0.2737) and dry recovery content (0.2453) but was found not significant. Further, oleoresin content was positively correlated and non-significant with dry recovery content (0.167).

The correlation data revealed that almost all growth, yield and quality attributing characters like plant height, number of leaves, number of tillers per clump, leaf length, leaf breadth, leaf area, length of fingers, girth of fingers, number of fingers per clump, length of clump, breadth of clump, volume of clump, oleoresin content and dry recovery content was found highly significant and correlated with the yield of ginger. Whereas, quality parameter like essential oil content was found to be not significant with the yield of ginger.

Table 1: Correlation co-efficient among different characters and with yield during 2014-15 and 2015-16

Characters	Yield clump^{-1}	Plant height	No of leaves	No of tillers clump^{-1}	Leaf length	Leaf breadth	Leaf area	Length of fingers	Girth of fingers	No of fingers clump^{-1}	Length of clump	Breadth of clump	Volume of clump	Essential oil	Oleor-esin
Yield clump^{-1}	1.000														
Plant height	0.9427**	1.000													
No of Leaves	0.9091**	0.5104*	1.000												
No of tillers clump^{-1}	0.926**	0.6679**	0.3522	1.000											
Leaf length	0.9914**	0.7594**	0.5497*	0.5971*	1.000										
Leaf breadth	0.9655**	0.5621*	0.4759	0.3569	0.7041**	1.000									
Leaf area	0.776**	0.7392**	0.5526*	0.5373*	0.9489**	0.8905**	1.000								
Length of fingers	0.65**	0.775**	0.6414**	0.2757	0.5883*	0.5908*	0.6387**	1.000							
Girth of Fingers	0.6139*	0.6269**	0.7715**	0.4129	0.6188*	0.6912**	0.7009**	0.8242**	1.000						
No of fingers clump^{-1}	0.5968*	0.6876**	0.7632**	0.5373*	0.6406**	0.6488**	0.6928**	0.7942**	0.96**	1.000					
Length of clump	0.5338*	0.7185**	0.7688**	0.414	0.6048*	0.7301**	0.7077**	0.8961**	0.9465**	0.9421**	1.000				
Breadth of clump	0.773**	0.7261**	0.7673**	0.4945	0.6429**	0.6731**	0.7073**	0.8505**	0.9107**	0.9177**	0.9635**	1.000			
Volume of clump	0.6488**	0.7333**	0.7475**	0.4462	0.6473**	0.6967**	0.7229**	0.8997**	0.9637**	0.9465**	0.9788**	0.9776**	1.000		
Essential oil	0.1056	0.4736	0.0305	0.0828	0.346	0.1596	0.2987	0.3895	0.175	0.1495	0.2315	0.3229	0.30	1.000	
Oleoresin	1.000**	-0.2179	-0.1139	-0.5897*	-0.2797	-0.153	-0.2428	-0.004	-0.0347	-0.1193	-0.038	-0.0794	-0.04	0.2737	1.000
Dry recovery content	0.9693**	-0.0017	0.1649	-0.1187	0.0329	0.0877	0.0434	0.1718	0.1186	0.1468	0.1994	0.2998	0.21	0.2453	0.167

*Note: ** indicates 1% level of significance; * indicates 5% level of significance*

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