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Correlation and regression studies in radish under valley condition of Garhwal hills

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Abstract
The Field experiment was conducted at Horticultural Research Centre, H.N.B. Garhwal University, Srinagar- Garhwal, Uttarakhand (India) during rabi season 2014-15 to evolution of 22 varieties of radish for yield potential and suitability under valley condition of Garhwal hills. The yield parameters showed significantly maximum root yield per hectare was recorded in variety of Evergreen. The plant height, number of leaves, days taken to harvest, length of root, diameter of root, total wt of plant, weight of leaf showed significant and positive correlation with root yield of radish. Unit increase in these character increases root yield 485.8, 1403.4, 561.3, 942.6, 77.1, 1557.8, 79.6 and 132.1 kg/ha, respectively. Negative correlation was obtained with TSS, Acidity and vit C.

Keywords: correlation, radish, regression, quality, variety and yield

Introduction
Radish is one of the most important edible and nutritious root vegetable crops in world. It belongs to family Brassicaceae, originated from the Europe and Asia (Thompson and Kelly, 1957) [9]. Radish is grown in tropical and temperate region. It is grown for its young tender tuberous roots which are eaten raw as salad or cooked as a vegetable. Radish is most frequently consumed root vegetable in different part of India because root and leaves are rich source of carbohydrate, vitamin A, vitamin C and minerals. The charecterestics pungent flavor of radish is due to the presence of volatile isothiosinate (trans-4-methylthiobrate climate. Radish is best adapted to a cool or moderate climate. Radish is useful in liver and gall bladder troubles. In homeopathy they are used for neurologic headaches and sleeplessness. Roots and leaves are active against gram-positive bacteria. The roots are useful in urinary complaints, piles and in gastrodynia. The juice of fresh leaves is used as diuretic and laxative. Pink skinned radish is generally richer in ascorbic acid than the white skinned one. Vitamin C content of radish roots is greatly influence by light condition. Sid'ko *et al.*, (1975) [8] found that root vitamin content was higher in plants grown under blue light, while Lichtenthaler (1975) [3] noted enhanced synthesis of β carotene under red light. The Asian cultivars with greater temperature adaptation can resist more heat than the European cultivars. Wendt (1977) [12] reported that, an increase in soil temperature from 5-20 ^{0}c favoured leaf development. At 20 - 25 ^{0}c uptake of nutrient was greater and dry matter content was higher but at a still higher temperature (25 – 30 ^{0}c).

Materials and Methods
The experimental materials constituted a collection of 22 varieties of radish (*Raphanus sativus* L.) namely, Arka Nishant, Baramasi, Bharsar Local 2, Dehli White, Dunagiri, Evergreen, Hill Queen, J.U, Japanese White, Local 1, Local 2, Local 3, Local 4, Local 5, Local 6, Local 7, Local 8, M.E.L.W, Pusa Mirdula, Snow White, Sonali White and Pusa Chetki varieties were collected from Bharsar, Ranichori, Srinagar, Rudrapriyag (UK), Varanasi (UP), Amritsar (Punjab), Jobner, Ajmer, Udaipur and Bhilwara (Rajastan). The experiment was conducted in rabi season, 2014-15 at Horticultural Research Centre of H.N.B. Garhwal University, Srinagar (Garhwal) situated in the Alaknanda valley (78° 47' 30" E longitude and 30° 13' 0" N latitude and at an elevation of 550 m above MSL), a semiarid, sub-tropical climate with dry summer and rigorous winters with occasional dense fog in the morning hours from mid December to mid February. The experiment was laid out in Randomized Block Design with three replications. The entire experimental field was divided into three blocks of equal size and each block possessed 22 plots. Each plot measured 3 X 2 m^2 area. The varieties were sowed at ridges of 23 to 25cm above the soil surface and spacing of ridges to ridges is 45 cm and plant to plant 6 to 8cm and seed are sown 1.5 to 3cm deep in the soil. All the recommended agronomic practices were followed to raise a healthy crop (Choudhury, 2000) [1]. Observation

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were recorded on quantitative and qualitative traits viz., plant height, number of leaves, days taken to harvest, leaf length, root length, diameter of root, yield/ha, TSS, and acidity on five randomly selected plants. The data obtained from selected plants were subjected to analysis of variance (Panse and Sukhatma, 1967).

Results and Discursion
Correlation and regression studies
To study the relationship of root yield with growth, yield and quality attributes correlation and regression studies were made which are summarized in table 2.

Relationship between growth attributes (X) and radish root yield (Y)
A reference of data (Table 1 and fig 1, 2 and 3) indicated that root yield of radish was significantly and positively correlated with Plant height (cm), Number of leaves, Days taken to harvest and length of leaf at harvest stage during the experimentation The values of correlation coefficient were found to be 0.544, 0.686, 0.312 and 0.058 for plant height, number of leaves, days taken to harvest and length of leaf,

respectively. The increase in root yield of radish due to each centimeter increase in plant height and length of leaf at harvest stage was 485.8 and 77.1 kg/ha.

Relationship between length of root (cm), Diameter of root (cm), Total wt. of plant, weight of leaf (g) and quality parameters (X) and mustard root yield (Y)
Simple correlation coefficients (r) were computed to study the relationship between radish root yield and crop parameters namely Length of root (cm), Diameter of root (cm), Total wt. of Plant, Weight of Leaf (g). It is clear from the data that root yield was significantly and positively correlated with all these attributes (Table 2). As such, the increase or decrease in root yield. The regression coefficients (b) and regression equations were also worked out to quantify the amount of change in root yield of radish for a unit change in these yield attributes of crop. Result showed that every unit increase in length of root (cm), diameter of root (cm), total wt. of Plant (g), weight of Leaf (g) increased the root yield of radish by 942.6, 1557.8, 79.6 and 132.1 kg/ha, respectively. Quality parameters namely TSS (°Brix), Acidity (mg/100g) and Vit.-C (mg/100g) were negatively correlated with root yield of radish.

Table 1: Correlation coefficients (r) and regression equations for the relationship between root yield (Y) (kg/ha) and growth, yield and quality attributing characters of radish (X)

S. No	Parameters	Correlation coefficient (r)	Regression equation $Y = a + b_y x .X$
1	Plant height (cm)	0.544**	$Y = 9362.9 + 485.8 X_1$
2	Number of leaves	0.686**	$Y = 13817.3 + 1403.4 X_2$
3	Days taken to harvest	0.312	$Y = 5387.2 + 561.3 X_3$
4	Length of root (cm)	0.731**	$Y = 14655.9 + 942.6 X_4$
5	Length of leaf (cm)	0.058	$Y = 33468.9 + 77.1 X_5$
6	Diameter of root (cm)	0.167	$Y = 30011.1 + 1557.8 X_6$
7	Total wt. of Plant (g)	0.834**	$Y = 10469.7 + 79.6 X_7$
8	Weight of Root (g)	0.856**	$Y = 12808.5 + 112.5 X_8$
9	Weight of Leaf (g)	0.541**	$Y = 20849.3 + 132.1 X_9$
10	TSS (°Brix)	-0.361	$Y = 66666.1 - 5474.6 X_{10}$
11	Acidity (mg/100g)	-0.222	$Y = 39199.1 - 13083.8 X_{11}$
12	Vit.-C (mg/100g)	-0.138	$Y = 39854.3 - 208.01 X_{12}$

** Significant at 1 per cent level of significance

Results showed that every unit increase in TSS, Acidity and vitamin C decreased the root yield 5474.6, 13083.8 and 208.01 kg/ha, respectively. Similar correlations of yield with various horticultural traits have also been reported earlier by several workers viz, Mukhdoomi et al (2008) [5], Ullah et al (2010) [10] and Jatoi et al (2011) [11]. Similar results also found Ndang and Sema (1999) [6] reported that maximum radish yield as obtained was due to higher fresh weight, length and

thickness of root and there was significant positive correlation. Mishra and Singh (1985) [4] and Vijay and Manohar (1990) [11] also reported similar interrelationship of yield and yield component in okra. This study provides information that all the yield parameters are positively and significantly correlated with radish yield and hence these are most important yield contributing vharacters.
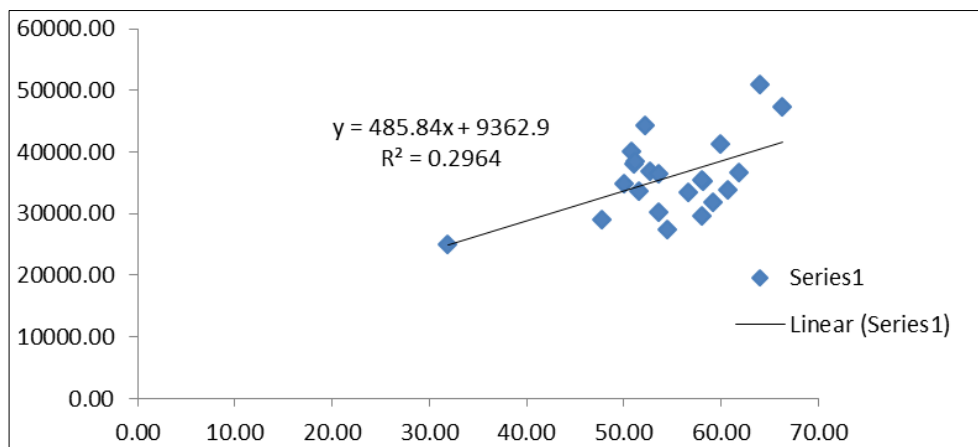

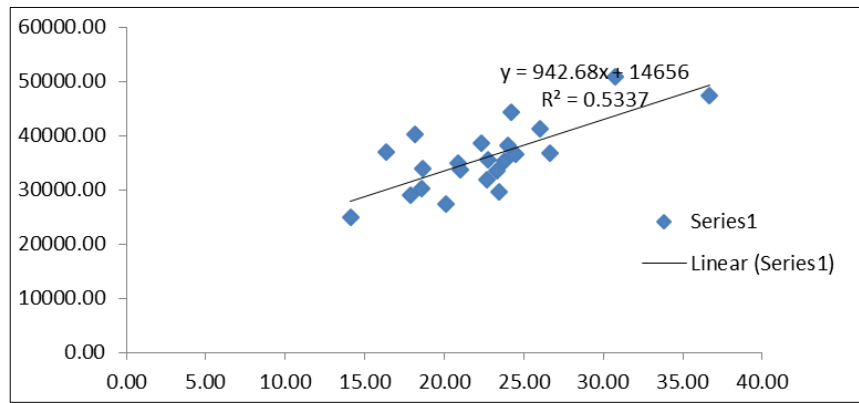**Fig 1:** Linear regression equation between root yield and plant height

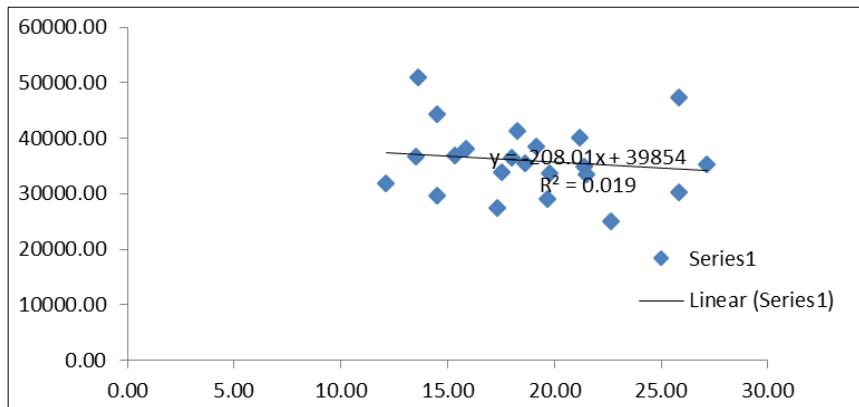**Fig 2:** Linear regression equation between root yield and Length of root

Fig 3: Linear regression equation between root yield and Vit. C

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