Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(3): 3310-3313
Received: 18-03-2018
Accepted: 22-04-2018

Nivedita Sharma
Department of Fruit Science, Dr Y S Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, India

RK Dogra
Department of Fruit Science, Dr Y S Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, India

Correspondence
Nivedita Sharma
Department of Fruit Science, Dr Y S Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, India

Association studies in nectarine for various horticultural traits in north-western Himalayas

Nivedita Sharma and RK Dogra

Abstract
Five nectarine cultivars were evaluated at the Model Farm, Directorate of Research, Dr Y S Parmar University of Horticulture and Forestry, Nauni, Solan (HP) during 2014-16 with the objective to study the association between yield and its dependent variables. Highly significant and positive phenotypic and genotypic correlations of yield were found with tree spread, tree volume, and fruit length and fruit weight. Maximum positive direct effect cited towards yield were contributed by fruit weight, tree spread, stone length, flower intensity, stone weight, total soluble solids, number of days from full bloom to maturity, pulp to stone ratio, tree height, duration of flowering, fruit set and trunk girth.

Keywords: nectarine, horticultural, north-western Himalayas

Introduction
Nectarine [*Prunus persica* (L.) Batsch var. *nucipersica*] is an emerging potential stone fruit crop belonging to family Rosaceae. It can be successfully cultivated upto 2000 m above mean sea level. The total production of nectarines has increased rapidly in recent years. There are over 100 varieties of nectarine, both freestone and clingstone varieties, under commercial cultivation in the world. In India, it is grown in some warm temperate and Sub-tropical regions particularly in Uttarakhand, western UP, Himachal Pradesh, Haryana, Punjab and North Eastern states. The fruits are smooth skinned, closely allied to peach, but are non-pubescent, unlike peaches. Nectarines have apparently originated from peach by mutation. The lack of pubescence is controlled by a single recessive gene, which is also responsible for the taste and smaller size of the fruit (Mcgregor, 1976) [1]. Nectarine is known for its juicy fruit of excellent appearance and quality. The fruit contains appreciable amount of Vitamin C, sugar and organic acids, besides rich in proteins and mineral contents. In recent times, the fruit has assumed greater significance due to its widespread use for table purpose and processing industry. In India, there are very few varieties under cultivation which have led to near genetic uniformity among the cultivars. The fruit yield is a very complex character and depends upon several component characters. Characters related with yield, plant growth, blooming and harvesting dates, and fruit quality traits are usually of quantitative nature. Quantitatively inherited characters constitute the bulk of the variability selected during the breeding process in fruit trees as in most cultivated species. These parameters may not be independent from each other, and therefore, should be studied as a whole and should be considered in breeding programs. The measurement of correlation between the characters is a matter of considerable influence in selection practise (Lerner, 1954) [2]. Selecting the component traits rather than yield itself could allow the selection for increased yield (Engledow and Wadham, 1923) [3]. The path analysis proposed by Wright (1921) [4] allows understanding better the association between variables and the study of the direct and indirect effects on one basic variable. The present endeavour aims to understand inherent relationship for fruit yield with various physiological and development traits in nectarines genotypes so as to bring improvement through future breeding programmes.

Material and Methods
The present investigation was carried out at Model Farm, Department of Fruit Science, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan Himachal Pradesh(India) at 1320 m above mean sea level between 31^0 N and 77^0 E witnessing mild temperate climate. The material consisted of five nectarine genotypes *viz* Mayfire, Sunrise, Silver King, Snow Queen and Spring Bright, which were planted during March, 2010. The observations were recorded for two consecutive years 2014-15 and 2015-2016 on four randomly selected plants and five fruit samples per replication each in five nectarines genotypes.

The plants were selected on the basis of the apparent yield performance and the past history of trees. During the course of study, all the recommended cultural practices were followed. The morphological traits, such as, tree height(m), tree spread(m), trunk girth(cm), tree volume(m^3), annual shoot growth(cm), leaf area(cm^2), date of opening of first flower, date of full bloom, date of opening of last flower, duration of flowering, flower intensity, fruit set(%), time of maturity, days from full bloom to harvest, fruit size(mm), fruit shape, fruit color, fruit weight(g), fruit volume(cm^3), fruit firmness(psi), stone size(mm), stone weight(g), pulp to stone ratio, yield per tree(kg) and yield efficiency(kg/m^2) were observed by using standard methods. The biochemical characteristics, such as, total soluble solids (°B), titratable acidity (%), total sugars (%), reducing sugars (%), non-reducing sugars (%) and sugar-acid ratio were also observed. The total soluble solid content was determined with digital pocket refracto hmeter (Pal-At ago, Japan). Acidity and sugars were calculated according to the standard procedures (AOAC, 1970) [5]. Sugar-acid ratio was calculated by dividing total sugars by titratable acidity.

The data recorded for each trait was analysed on mean values from pooled data using standard Randomized Complete Block Design with four replications as described by Gomez and Gomez (1983) [6]. Each single tree randomly selected in a genotype was considered as one replication. The genotypic and phenotypic correlation coefficients were calculated as per Al- Jibouri *et al*., (1958) [7] by implying the techniques of statistical analysis in variance-covariance matrix analysis in which total variability had been split into replications, genotypes and errors. The phenotypic and genotypic correlation coefficients were used in finding out their direct and indirect contribution towards yield per tree. To have a deeper insight into, the direct and indirect effects of various yield components (independent variables) on dependent variables (fruit yield), the path coefficient analysis was worked out. Path coefficient analysis splits up the correlation coefficients between each pair of dependent variables and independent variables into a direct effect (path coefficient) and as indirect effects or via effects (path coefficient × correlation coefficient). Thus, the correlation coefficients between dependent variables and independent variables, which are of utmost importance, are the summation of direct and indirect effects. Path coefficient analysis was done by the method given by Dewey and Lu (1959) [8].

Results and Discussion

Correlation studies

The variation in correlation coefficient may be due to heterogeneous population having differences in genetic makeup of individual trees. The significant and positive correlation between different pairs can be helpful for genetic improvement of different characters in single step, if the higher or low value of each is required. While the negatively associated characters where increase or decrease in values of both the characters is required cannot be improved in a single step. The characters which had no significant correlation suggest that they are independent of each other. Fruit yield was taken as dependent variable. Genotypic and phenotypic correlation coefficients are presented in Table 1. In general, the genotypic correlation coefficients were higher in magnitude than phenotypic correlation coefficients.

Yield had highest positive association with tree spread (0.96) and tree volume (0.96) followed by fruit length (0.94) and fruit weight (0.79) indicating that selection of these traits would also lead to improvement in yield. It had negative correlations with duration of flowering (-0.69) and fruit firmness (-0.89). Fruit weight was positively correlated with pulp to stone ratio (0.58) which was in accordance with the work done by Perez *et* al., (1993) [9], who reported positive correlation between fruit weight and flesh to pit ratio (0.60) in peach. Meratinic *et al*., (2007) [10] reported that yield was in a very significant correlation with fruit and stone weight and dimensions which supported the results of the present study where yield had positive correlations with fruit length (0.94), fruit diameter (0.56), fruit weight (0.78), stone length (0.93), stone diameter (0.73) and stone weight (0.70).

Duration of flowering had negative correlation with most of the characters studied. Flower intensity showed highest positive and significant correlation with leaf area (0.92). Fruit set had positive and significant correlation with total sugars (0.79), flower intensity (0.72), fruit length (0.71), annual shoot growth (0.70), total soluble solids (0.70), yield per tree (0.66), leaf area (0.65), titratable acidity (0.60), tree volume (0.55), tree spread (0.52) and tree height (0.49).

Fruit length was found to have positive and significant correlation with most of the characters studied except duration of flowering and fruit firmness and had highest positive correlation with yield per tree (0.94). Fruit diameter showed positive and significant correlation with fruit volume (0.94), fruit weight (0.88), stone length (0.70), stone diameter (0.69), fruit length (0.64), yield per tree (0.56), stone weight (0.53), pulp to stone ratio (0.52) and tree spread (0.52). However, fruit weight showed positive and significant correlation with all the characters studied except fruit firmness (-0.70), but showed highest correlation with fruit volume (0.99).

Path analysis

Correlation study measures the mutual association without regard to causation, so, correlation may not always provide a true picture of association. The association becomes complex when many correlated characters are affecting the particular variable. In such situation, a path coefficient analysis enables to revaluate the direct effect of one cause on an effect and its indirect effect through other causes. In the present study for path analysis fruit yield per plant was taken as dependent character and other component traits were considered as independent variables. The direct and indirect effects of various traits were worked out from pooled correlation matrix and are presented in Table 2.

Maximum positive direct effect towards yield was contributed by fruit weight (0.57), tree spread (0.57), stone length (0.48), flower intensity (0.25), stone weight (0.19), total soluble solids (0.19), number of days from full bloom to maturity (0.18) and pulp to stone ratio (0.15), which suggests that selection for these traits would be effective for improving yield in nectarine genotypes (Table 2). Similar results were obtained by De Souza *et al.*, (1998) [11] which observed that direct selection practiced solely for early ripening and short fruit development period and is expected to have a greater effect on correlated traits than direct selection for early bloom and large fruit mass.

However, fruit set had positive indirect effect via tree spread (0.35), fruit weight (0.25), stone length (0.22), flower intensity (0.20) and total soluble solids (0.15). Number of days from full bloom to maturity showed positive indirect effect via fruit weight (0.18), total soluble solids (0.12) and fruit firmness (0.10). Fruit length showed indirect effect via tree spread (0.53), fruit weight (0.47), stone length (0.39) and flower intensity (0.22). Fruit diameter depicted positive indirect effect via fruit weight (0.50), stone length (0.34) and tree spread (0.34). Fruit weight showed positive indirect effect via tree spread (0.42) and stone length (0.39). Fruit volume depicted positive indirect effect via fruit weight (0.56), tree spread (0.42), stone length (0.39) and stone weight (0.16).

Selection of the traits having positive indirect effect would lead to improvement in the traits on which they have indirect effects ultimately affecting the yield. Matias *et al*., (2014) [12] reported that the direct and indirect effects of the studied physical and chemical characters did not exceed the residual effect (0.66). As low magnitude of residual effect at genotypic level indicated that the traits included in the investigation accounted for most of the variation present in the dependent variable that is fruit yield per plant.

Table 1: Phenotypic and genotypic coefficients of correlation among different traits in nectarine genotypes

		X2	**X3**	**X4**	**X5**	**X6**	**X7**	**X8**	**X9**	**X10**	**X11**	**X12**	**X13**	**X14**	**X15**	**X16**	**X17**	**X18**	**X19**	**X20**	**X21**	**X22**	**X23**
X1	P	0.92*	0.97*	0.94*	0.54*	0.96*	-0.86	0.91*	0.49*	-0.17	0.75*	0.30	0.55*	0.50*	-0.69	0.87*	0.76*	0.79*	-0.15	0.60*	0.86*	0.64*	0.86*
	G	0.94*	0.98*	0.96*	0.59*	0.97*	-0.93	0.96*	0.55*	-0.17	0.77*	0.31	0.55*	0.51*	-0.70	0.88*	0.77*	0.97*	-0.21	0.61*	0.94*	0.66*	0.89*
X2	P		0.91*	0.99*	0.72*	0.91*	-0.70	0.88*	0.52*	0.09	0.89*	0.52*	0.69*	0.68*	-0.88	0.94*	0.81*	0.65*	0.03	0.75*	0.68*	0.79*	0.96*
	G		0.95*	0.99*	0.76*	0.94*	-0.78	0.94*	0.60*	0.11	0.91*	0.54*	0.71*	0.70*	-0.90	0.96*	0.82*	0.69*	-0.04	0.76*	0.81*	0.82*	0.98*
X3	P			0.92*	0.51*	0.92*	-0.80	0.88*	0.41	-0.19	0.74*	0.35	0.55*	0.52*	-0.71	0.88*	0.81*	0.65*	-0.20	0.58*	0.79*	0.62*	0.87*
	G			0.96*	0.55*	0.94*	-0.90	0.93*	0.48*	-0.20	0.75*	0.36	0.56*	0.53*	-0.72	0.89*	0.82*	0.75*	-0.20	0.59*	0.91*	0.63*	0.88*
X4	P				0.71*	0.94*	-0.74	0.91*	0.55*	0.07	0.88*	0.47	0.66*	0.64*	-0.86	0.92*	0.78*	0.68*	0.001	0.75*	0.73*	0.79*	0.96*
	G				0.76*	0.96*	-0.82	0.96*	0.63*	0.08	0.90*	0.48*	0.68*	0.65*	-0.87	0.94*	0.79*	0.73*	-0.08	0.76*	0.85*	0.82*	0.98*
X5	P					0.68*	-0.37	0.68*	0.70*	0.63*	0.87*	0.39	0.61*	0.57*	-0.76	0.62*	0.31	0.54*	0.21	0.85*	0.36	0.84*	0.78*
	G					0.75*	-0.54	0.79*	0.96*	0.71*	0.96*	0.43	0.67*	0.64*	-0.83	0.68*	0.33	0.74*	0.27	0.92*	0.59*	0.90*	0.87*
X6	P						-0.84	0.92*	0.65*	0.04	0.83*	0.22	0.51*	0.45	-0.74	0.81*	0.62*	0.77*	-0.17	0.76*	0.86*	0.79*	0.90*
	G						-0.90	0.95*	0.72*	0.04	0.83*	0.23	0.52*	0.46	-0.74	0.82*	0.63*	0.92*	-0.22	0.78*	0.94*	0.81*	0.92*
X7	P							-0.79	-0.60	0.24	-0.58	-0.05	-0.41	-0.31	0.38	-0.63	-0.47	-0.53	0.05	-0.41	-0.73	-0.48	-0.69
	G							-0.94	-0.65	0.25	-0.64	-0.06	-0.45	-0.33	0.42	-0.70	-0.52	-0.79	0.18	-0.45	-0.87	-0.53	-0.77
X8	P								0.72*	0.08	0.82*	0.21	0.51*	0.45	-0.70	0.78*	0.57*	0.70*	-0.10	0.74*	0.85*	0.79*	0.90*
	G								0.77*	0.07	0.85*	0.22	0.53*	0.47	-0.73	0.81*	0.59*	0.93*	-0.18	0.78*	0.96*	0.82*	0.92*
X9	P									0.53*	0.71*	0.05	0.42	0.32	-0.45	0.41	0.04	0.35	0.16	0.70*	0.60*	0.79*	0.66*
	G									0.56*	0.79*	0.06	0.46	0.35	-0.50	0.45	0.04	0.52*	0.16	0.78*	0.68*	0.86*	0.71*
X10	P										0.46	0.26	0.29	0.31	-0.41	0.05	-0.23	0.04	0.36	0.57*	-0.18	0.60*	0.26
	G										0.46	0.27	0.30	0.31	-0.42	0.05	-0.23	0.05	0.46	0.59*	0.22	0.62*	0.25
X11	P											0.64*	0.83*	0.80*	-0.85	0.82*	0.57*	0.72*	0.24	0.77*	0.51*	0.87*	0.94*
	G											0.64*	0.83*	0.81*	-0.86	0.82*	0.59*	0.93*	0.38	0.78*	0.62*	0.88*	0.96*
X12	P												0.88*	0.94*	-0.67	0.70*	0.69*	0.53*	0.52*	0.22	0.01	0.35	0.56*
	G												0.89*	0.95*	-0.67	0.70*	0.71*	0.70*	0.74*	0.22	0.02	0.36	0.57*
X13	P													0.99*	-0.70	0.84*	0.69*	0.67*	0.58*	0.38	0.37	0.56*	0.78*
	G													0.99*	-0.71	0.84*	0.69*	0.80*	0.72*	0.38	0.40	0.57*	0.79*
X14	P														-0.75	0.84*	0.73*	0.66*	0.57*	0.37	0.26	0.54*	0.75*
	G														-0.76	0.85*	0.74*	0.80*	0.69*	0.38	0.29	0.55*	0.76*
X15	P															-0.87	-0.74	-0.79	-0.08	-0.83	-0.41	-0.86	-0.89
	G															-0.87	-0.74	-0.94	-0.10	-0.83	-0.45	-0.86	-0.90
X16	P																0.91*	0.77*	0.15	0.58*	0.62*	0.68*	0.93*
	G																0.91*	0.80*	0.19	0.59*	0.69*	0.69*	0.94*
X17	P																	0.78*	0.05	0.33	0.45	0.38	0.73*
	G																	0.94*	0.05	0.33	0.50*	0.40	0.74*
X18	P																		-0.20	0.56*	0.64*	0.65*	0.70*
	G																		0.16	0.71*	0.74*	0.77*	0.75*
X19	P																			-0.11	-0.22	0.04	0.13
	G																			-0.16	-0.22	0.06	0.13
X20	P																				0.47	0.96*	0.77*
	G																				0.53*	0.97*	0.78*
X21	P																					0.52*	0.70*
	G																					0.59*	0.78*
X22	P																						0.86*
	G																						0.87*

X1 = Tree height X2 = Tree spread X3= Trunk girth X4= Tree volume
X5 = annual shoot growth X6 - Leaf area X7= Duration of flowering X8 = Flower density X9 = Fruit set
X10 - Number of days from full bloom to maturity X11= Fruit length X12 = Fruit breadth X13 = Fruit weight
X14 = Fruit volume X15= Fruit firmness X16 = Stone length X17 = Stone diameter X18 - Stone weight
X19 = Pulp to stone ratio X20 = Total soluble solids X21= Titratable acidity X22= Total sugars X23 = Yield correlation values
G = Genotypic correlation values
P = Phenotypic correlation values
* Significant at 0.05 level

Table 2: Estimates of direct and indirect effects of different traits on yield of nectarine genotypes

	X1	**X2**	**X3**	**X4**	**X5**	**X6**	**X7**	**X8**	**X9**	**X10**	**X11**	**X12**	**X13**	**X14**	**X15**	**X16**	**X17**	**X18**	**X19**	**X20**	**X21**	**X22**	**X23**
X1	0.05	0.55	0.004	-0.21	-0.05	-0.13	-0.01	0.24	0.01	-0.02	-0.06	-0.11	0.34	-0.28	0.14	0.38	-0.05	0.18	-0.01	0.10	-0.02	-0.18	0.89*
X2	0.05	0.57	0.004	-0.21	-0.06	-0.13	-0.01	0.23	0.01	0.03	-0.07	0.17	0.41	-0.36	0.19	0.42	-0.06	0.20	0.01	0.13	-0.01	-0.22	0.98*

X3	0.05	0.55	0.004	-0.20	-0.04	-0.14	-0.01	0.24	0.01	-0.02	-0.06	-0.12	0.34	-0.29	0.16	0.41	-0.06	0.19	-0.02	0.11	-0.02	-0.18	0.88*
X4	0.05	0.57	0.004	-0.22	-0.06	-0.13	-0.01	0.24	0.01	0.02	-0.07	-0.16	0.40	-0.34	0.18	0.40	-0.05	0.19	0.007	0.13	-0.02	-0.22	0.98*
X5	0.03	0.47	0.003	-0.17	-0.08	-0.11	-0.01	0.20	0.01	0.12	-0.07	-0.14	0.39	-0.33	0.17	0.29	-0.02	0.14	0.05	0.16	-0.01	-0.27	0.87*
X6	0.05	0.54	0.004	-0.20	-0.06	-0.14	-0.01	0.25	0.01	0.01	-0.06	-0.08	0.31	-0.25	0.16	0.38	-0.04	0.18	-0.02	0.14	-0.02	-0.23	0.92*
X7	-0.03	-0.31	-0.003	0.12	0.02	0.10	0.01	-0.20	-0.01	0.04	0.03	-0.004	-0.19	0.11	-0.09	-0.31	0.04	-0.14	0.04	-0.08	0.02	0.15	-0.77
X8	0.05	0.53	0.004	-0.20	-0.06	-0.14	-0.01	0.25	0.01	0.02	-0.07	-0.08	0.32	-0.25	0.16	0.38	-0.05	0.18	-0.15	0.15	-0.02	-0.24	0.92*
X9	0.03	0.35	0.002	-0.13	-0.07	-0.10	-0.01	0.20	0.01	0.10	-0.06	-0.01	0.25	-0.17	0.11	0.22	-0.01	0.10	0.02	0.15	-0.02	-0.25	0.71*
X10	-0.01	0.08	-0.001	-0.03	-0.05	-0.01	0.003	0.02	0.01	0.18	-0.04	-0.08	0.18	-0.16	0.10	0.03	0.02	0.01	0.07	0.12	0.005	-0.19	0.25
X11	0.04	0.53	0.003	-0.19	-0.07	-0.12	-0.01	0.22	0.01	0.08	-0.08	-0.19	0.47	-0.40	0.19	0.39	-0.05	0.18	0.05	0.15	-0.15	-0.26	0.96*
X12	0.02	0.34	0.002	-0.11	-0.04	-0.04	0.001	0.07	0.001	0.05	-0.05	-0.30	0.50	-0.47	0.15	0.34	-0.06	0.13	0.10	0.04	0.001	-0.11	0.57*
X13	0.03	0.42	0.003	-0.15	-0.05	-0.08	-0.004	0.14	0.007	0.06	-0.06	-0.27	0.57	-0.48	0.16	0.39	-0.05	0.16	0.11	0.07	-0.010	-0.17	0.79*
X14	0.03	0.42	0.002	-0.15	-0.05	-0.07	-0.003	0.13	0.005	0.06	-0.06	-0.28	0.56	-0.49	0.16	0.39	-0.06	0.16	0.11	0.07	-0.07	-0.16	0.76*
X15	-0.03	-0.47	-0.003	0.17	0.06	0.10	0.005	-0.18	-0.007	-0.08	0.06	0.20	-0.39	0.36	-0.23	-0.41	0.06	-0.18	-0.01	-0.16	0.01	0.26	-0.90
X16	0.04	0.50	0.004	-0.18	-0.05	-0.11	-0.01	0.20	0.007	0.01	-0.06	-0.21	0.46	-0.40	0.20	0.48	-0.07	0.20	0.03	0.11	-0.02	-0.20	0.94*
X17	0.04	0.43	0.003	-0.15	-0.02	-0.08	-0.006	0.15	0.001	-0.04	-0.04	-0.21	0.38	-0.35	0.17	0.44	-0.08	0.18	0.01	0.06	-0.01	-0.11	0.74*
X18	0.05	0.61	0.004	-0.22	-0.06	-0.13	-0.01	0.24	0.01	0.01	-0.07	-0.21	0.47	-0.41	0.22	0.50	-0.07	0.19	0.04	0.14	-0.02	-0.23	0.75*
X19	-0.003	0.04	0.001	-0.01	-0.03	0.02	0.003	-0.03	0.002	0.09	-0.03	-0.22	0.44	-0.37	0.03	0.10	-0.01	0.05	0.15	-0.03	0.006	-0.03	0.13
X20	0.03	0.40	0.002	-0.15	-0.06	-0.11	-0.005	0.19	0.011	0.11	-0.06	-0.07	0.21	-0.18	0.19	0.28	-0.02	0.14	-0.02	0.19	-0.01	-0.29	0.78*
X21	0.04	0.42	0.004	-0.16	-0.04	-0.13	-0.012	0.24	0.011	-0.04	-0.05	-0.005	0.22	-0.14	0.11	0.34	-0.04	0.15	-0.04	0.10	-0.02	-0.18	0.78*
X22	0.03	0.44	0.003	-0.16	-0.07	-0.11	-0.006	0.20	0.012	0.12	-0.07	-0.11	0.32	-0.26	0.19	0.33	-0.03	0.15	0.01	0.18	-0.01	-0.30	0.87*

X1= Tree height X2 = Tree spread X3 = Trunk girth X4 = Tree volume X5 = annual shoot growth X6 - Leaf area
X7= Duration of flowering X8 = Flower density X9 = Fruit set X10 - Number of days from full bloom to maturity
X11 = Fruit length X12 = Fruit breadth X13 = Fruit weight X14 = Fruit volume X15 = Fruit firmness
X16 = Stone length X17 = Stone diameter X18 - Stone weight X19 = Pulp to stone ratio X20 = Total soluble solids
X21= Titratable acidity X22 = Total sugars X23 = Yield correlation values
Residual effect= 0.0039
Underline figures are direct effects
* Sgnificant at 0.05 level

Conclusion

Correlation studies revealed that yield per tree had highest positive association with tree spread and tree volume, followed by fruit length and fruit weight, which indicated that selection of these traits would be effective for isolating genotypes with higher fruit yield. In Path analysis, the maximum positive direct effect towards fruit yield per tree was imparted by fruit weight, tree spread, stone length, flower intensity, stone weight, total soluble solids, number of days from full bloom to maturity and pulp-stone ratio, suggesting thaqt selection for these traits would be effective for improving yield in nectarine genotypes.

References

1. Mcgregor SE. Insect pollination of cultivated crop plants. USDA, Tuscon, Arizona, 1976.
2. Lerner IM. Genetic Homeostasis. University of California, Berkley, 1954.
3. Engledow FL, Wadham MA. Investigations on yield of the cereal. Part I. The Journal of Agricultural Science. 1923; 13:390-439
4. Wright PS. A correlation and causation. The Journal of Agricultural Research. 1921; 20:557-585
5. AOAC. Official methods of the analysis of the Association of Official Analytical Chemists. Published by Association of Official Analytical Chemists, Benjamin Franklin Station, Washington, D C, 1970.
6. Gomez KA, Gomez AA. Statistical Procedures for Agricultural Rresearch. John Wiley and Sons Inc., New York. 1983, 357-427.
7. Al-Jibouri HA, Miller PA, Robinson HF. Genotypic and environmental variances and co-variances in an upland cotton cross of interspecific origin. Agronomy Journal. 1958; **50**:633-636.
8. Dewey DR, Lu KH. A correlation and path-coefficient analysis of components of crested wheatgrass seed production. Agronomy Journal. 1959; 51:515-518.
9. Perez S, Montes S, Mejia C. Analysis of peach Germplasm in Mexico. Journal of The American Society for Horticultural Science. 1993; 118(4):519-524.
10. Meratinic E, Rakonjac V, Milatovic D. Genetic parameters of yirld and morphological fruit and stone properties in apricot. *Genetika*. 2007; 39(3):315-324.
11. De Souza BV, Byrne DH, Taylor JF. Heritability, genetic and phenotypic correlations and predicted selection response of quantitative traits in peach: II. An analysis of several fruit traits. Journal of American Society for Horticultural Science. 1998; 123(4):604-611.
12. Matias GR, Bruckner CH, Carneiro PC, Silva DF, Silva JO. Repeatibility, correlation and path analysis of physical and chemical characteristics of peach fruits. Revista Brasileira de Fruiticultura. 2014; 36(4):1-6.