International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(5): 294-296

Received: 19-07-2019
Accepted: 21-08-2019

DA Sagbhor
M.Sc. (Agri.) Student, Department of Horticulture, College of Agriculture, Kolhapur, Maharashtra, India

SP Gaikwad
Assistant Professor of Horticulture, National Agricultural Research Project, Ganeshkhind, Pune, Maharashtra, India

AA Bhagat
Assistant Professor of Statistics, National Agricultural Research Project, Ganeshkhind, Pune, Maharashtra, India

Correspondence
AA Bhagat
Assistant Professor of Statistics, National Agricultural Research Project, Ganeshkhind, Pune, Maharashtra, India

Path coefficient analysis in fenugreek genotypes

DA Sagbhor, SP Gaikwad and AA Bhagat

Abstract
A set of 24 genotypes were evaluated to study the nature and association among different characters. The experiment was laid out in randomized block design with two replications. Path coefficient analysis was carried out using genotypic correlation coefficient for average weight of plant (g) as dependent variable. Path analysis revealed that the number of leaves had highest positive direct effect on average weight of plant followed by number of root nodules, plant height along with root, leaf area and biological yield. Whereas total chlorophyll content had the highest negative direct effect on average weight of plant followed by plant height, number of secondary roots, root length and days to harvesting.

Keywords: Fenugreek, genotypes, direct effect and indirect effect

Introduction
Fenugreek is an annual self pollinated diploid crop belonging to the family Fabaceae. The crop is native to an area extending from Iran to northern India. It is widely cultivated in China, North and South Africa, Ukraine and Greece (Petropoulos, 2002) [8]. In India, it is mainly cultivated in Rajasthan, Gujarat, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, Himachal Pradesh and Haryana with total area of 1.23 lakh hectare and production of 1.31 lakh MT. It is grown in *rabi* season, in frost free, moderately cool climate and clear sky throughout the growth. It is essentially a winter season crop and grows well in low temperature, but for leafy vegetables off-season cultivations also practiced. Fenugreek is mainly grown as leafy vegetable throughout Maharashtra, there is ample scope for its cultivation as a leafy vegetable as well as seed spice. But there is lack of systematic research work on fenugreek particularly with respect to crop as a leafy vegetable in Maharashtra.
The fenugreek genotypes differ in morphology, growth habit, biomass and seed production capability. Path coefficient analysis is an important tool for partitioning the correlation coefficients into the direct and indirect effects of independent variables on a dependent variable. In such circumstances, path coefficient analysis provides an effective means of a critical examination of specific forces action to produce a given correlation and measure the relative importance of each factor. The average weight of plant at harvesting (g) was taken as dependent variable and the rest of the characters were considered as independent variables.

Materials and Methods
The experimental material for the present investigation consisted 24 lines of fenugreek collected from different parts of Maharashtra as well as Vegetable Research Scheme, NARP, Ganeshkhind, Pune was used in the present study. A uniform piece of fertile land was selected and brought to the fine tilth by adopting recommended preparatory operations. A basal dose of 25 kg N, 45 kg P_2O_5, 45 kg K_2O per ha was applied at the time of sowing. Seeds were directly sown by line sowing. The spacing of 15 cm between the rows was adopted. The cultural practices like plant protection and weeding were followed as and when required during the crop growth period. The experiment was laid out in randomized block design with two replications. The analysis of variance was done as suggested by Panse and Sukhatme (1985). Five plants were selected at random from each genotype in each replication. The observations were recorded on total plant height along with root (cm), plant height (cm), number of leaves, number of secondary root, number of root nodules, chlorophyll content (mg/100g), leaf area (cm^2), Days to harvesting, biological yield (q/ha) and average weight of plant at harvesting(g).
The path coefficient analysis which is splits total correlation coefficient of different characters into direct and indirect effects on average weight of plant at harvesting (g) in such a manner

that the sum of direct and indirect effects is equal to total genotypic correlation. Path coefficient analysis was carried out using genotypic correlation coefficient for average weight of plant (g) as dependent variable as suggested by Wright (1921) [13] and illustrated by Dewey and Lu (1959) [3]. The present investigation was undertaken to study the path analysis between genotypes of fenugreek.

Results and Discussion

The results on direct and indirect effects of nine characters on average weight of plant at harvesting are presented in (Table 1). The genotypic path analysis of different characters revealed that number of leaves (0.7889) had highest positive direct effect on average weight of plant followed by number of root nodules (0.4907) and the characters viz., plant height along with root, leaf area and biological yield. While total chlorophyll content (-0.4301), plant height (-0.2904), number of secondary root (-0.1567) and days to harvesting (-0.0711) had negative direct effect on average weight of plant. Similar results were reported by Datta *et al*. (2005) [2] and Sharma and Sastry (2008) [11] in fenugreek showed that number of leaves and plant height had positive direct effect on yield.

The indirect effects of the plant height along with root via average weight of plant via. plant height (0.2459), number of secondary roots (0.1483), biological yield (0.1329), number of root nodules (0.1198) and number of leaves (0.0250) were positive where as it had negative contribution through total chlorophyll content (-0.0568), days to harvesting (-0.0300) and leaf area (-0.0017). Similar results were reported by Singh *et al*. (2013) [5] in fenugreek indicating positive indirect effect on vegetative yield. It has positive indirect effect on via. total chlorophyll content (0.1147) and days to harvesting (0.0518), whereas it had negative contribution through, plant height along with root (-0.2736), number of secondary roots (-0.1473), number of root nodules (-0.0463), leaf area (-0.0216) and number of leaves (-0.0031). The indirect effect of number of leaves via biological yield (0.1610), total chlorophyll content (0.1490), plant height along with root (0.0755), number of secondary root (0.0320), leaf area (0.0318) and plant height (0.0084) were positive, whereas it had negative contribution through, days to harvesting (-0.2763) and number of root nodules (-0.0313).

Number of secondary roots imparted positive indirect effect via days to harvesting (0.0554), total chlorophyll content (0.0491) and leaf area (0.0318). where it had negative contribution through, biological yield (-0.1175), number of root nodules (-0.0579), plant height along with root (-0.0890), plant height (-0.0795) and number of leaf (-0.0063). Number of root nodules imparted positive indirect effect on average weight of plant via plant height along with root (0.2252), total chlorophyll content (0.2086), number of secondary roots (0.1812), biological yield (0.1374) and plant height (0.0783) where as it had negative contribution through leaf area (-0.0420), days to harvesting (-0.0249) and number of leaves (-0.0194). Total chlorophyll content imparted positive indirect effect via plant height (0.1699) no of secondary roots (0.1348), plant height along with root (0.0937), biological yield (0.0806), whereas it had negative contribution through number of root nodules (-0.1828), number of leaves (-0.0812), days to harvesting (-0.0550) and leaf area (-0.0277). Leaf area imparted positive indirect effect on average plant weight via plant height (0.0163), total chlorophyll content (0.0141) and number of leaves (0.0088). It had negative contribution through, biological yield (-0.1175), number of secondary roots (-0.1007), leaf area (-0.0420), days to harvesting (-0.0099), number of root nodules (-0.0187) and plant height along with root (-0.0014). Days required for harvesting imparted positive indirect effect via biological yield (0.0343), number of secondary roots (0.0252), number of leaves (0.0249), plant height (0.0127), plant height along with root (0.0082), number of root nodules (0.0036) and leaf area (0.0032), whereas it had negative contribution through, total chlorophyll content (-0.0091). The biological yield imparted positive indirect effect via number of secondary roots (0.0309), plant height along with root (0.0217), number of root nodules (0.0119), plant height (0.0174) and number of leaves (0.0087), whereas it had negative contribution through leaf area (-0.0228), Days to harvesting (-0.0205) and total chlorophyll content (-0.0080). Similar trend was reported by Singh *et al.* (2013) [5] stating vegetative yield had indirect effects through plant height while days to harvesting and chlorophyll content had negative indirect effect in lower magnitude.

The present study suggested that more emphasis should be given to selecting genotypes with plant height, number of leaves and total chlorophyll. Directly or indirectly majority of the characters showed positive effect on average weight of plant. The present findings are in conformity with those reported by Thakur, R (2018) [12], Meena *et al. (*2014) [7], Singh *et al*. (2016) [10], Jain *et al*. (2013) [5], Fikreselassie *et al*. (2012) [5], Dashora *et al*. (2011) [1], Sharma and Sastry (2008) [11] and Singh *et al*. (2006) [9] in fenugreek, Kumar *et al*. (2017) [6] in coriander.

Table 1: Direct (diagonal) and indirect (above and below diagonal) effects of nine characters on average weight of plant in Fenugreek genotypes (g).

	Plant height along with root (cm)	Plant height (cm)	No. of Leaves	No. of secondary Roots	No. of Root noduls	Chlorophyll content (mg/100g)	Leaf area (cm^2)	Days to harvesting	Biological yield (q/ha)	Average weight of plant at harvesting (g)
Plant height along with root (cm)	0.2610	0.2459	0.0250	0.1483	0.1198	-0.0568	-0.0017	-0.0300	0.1329	0.3212
Plant height (cm)	-0.2736	-0.2904	-0.0031	-0.1473	-0.0463	0.1147	-0.0216	0.0518	-0.1192	0.1790
No. of Leaves	0.0755	0.0084	0.7898	0.0320	-0.0313	0.1490	0.0318	-0.2763	0.1610	0.7471
No.of secondary Root	-0.0890	-0.0795	-0.0063	-0.1567	-0.0579	0.0491	0.0721	0.0554	-0.1140	0.1478
No.of Root nodules	0.2252	0.0783	-0.0194	0.1812	0.4907	0.2086	-0.0420	-0.0249	0.1374	0.2891
Chlorophyll content (mg/100g)	0.0937	0.1699	-0.0812	0.1348	-0.1828	-0.4301	-0.0277	-0.0550	0.0806	0.0315
leaf area (cm^2)	-0.0014	0.0163	0.0088	-0.1007	-0.0187	0.0141	0.2188	-0.0099	-0.1175	0.2102
Days to harvesting	0.0082	0.0127	0.0249	0.0252	0.0036	-0.0091	0.0032	-0.0711	0.0343	-0.3805
Biological yield (q/ha)	0.0217	0.0174	0.0087	0.0309	0.0119	-0.0080	-0.0228	-0.0205	0.0425	0.2381

Conclusion

Path analysis revealed that the number of leaves had highest positive direct effect on average weight of plant followed by number of root nodules, plant height along with root, leaf area and biological yield. Whereas total chlorophyll content had the highest negative direct effect on average weight of plant followed by plant height, number of secondary roots, root length and days to harvesting.

References

1. Dashora A, Maloo SR, Dashora LK. Variability, correlation and path coefficient analysis in fenugreek (*Trigonella foenum-graecum* L.) under water limited conditions. J of spices and aromatic crops. 2011; 20(1):38-42.
2. Datta S, Chatterjee R, Mukharjee S. Variability, heritability and path analysis studies in fenugreek. Int. J hort. 2005; 62(1):96-98.
3. Dewey DR, Lu KH. A correlation and path coefficient analysis of components of crested wheat grass production. Agron. J 1959; 51:515-518.
4. Fikreselassie MZH, Alemayehu N. Genetic variability of Ethiopian fenugreek (*Trigonella foenum-graecum* L.) landraces J of Plant Breeding and Crop Sci. 2012; 4(3):39-48.
5. Jain A, Singh B, Solanki RK, Saxena SN, Kakani RK. Genetic variability and character association in fenugreek (*Trigonella foenum-graecum* L.). Int. J Seed Spices 2013; 3(2):22-28.
6. Kumar S, Singh JP, Mohan C, Sarkar M, Sah H. Character association and path analysis in coriander (*Coriandrum sativum* L.) for yield and its attributes. Int. J Pure App. Biosci. 2017; 5(1):812-818.
7. Meena YK, Kale VS, Meena OP. Correlation coefficient and path analysis in coriander. Int. J of Scientific and Research Publications. 2014; 4(6):1-4.
8. Petropoulos GA. Fenugreek, the genus *Trigonella*. Taylor and Francis, London and New York 2002, 255.
9. Singh SP, Prasad R. Genetic Variability and path analysis in coriander. J Applied Biosci. 2006; 32:27-31.
10. Singh PP, Gujar M and Naruka IS. Association and path analysis in fenugreek (*Trigonella foenum-graecum* L.). Int. J of Agric. Sci. 2016; 86(7):951-955.
11. Sharma KC, Sastry EVD. Path analysis for seed yield and its component characters in fenugreek (*Trigonella foenum-graecum* L.). J of Spices and Aromatic Crops 2008; 17(2):69-74.
12. Thakur R. Variability and association studies for foliage yield components and its quality parameters in coriander ((*Coriandrum sativum* L.). M.Sc. thesis submitted to Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh (India), 2018.
13. Wright S. Correlation and causation. J Agric. Res. 1921; 20:557-585