STUDIES ON SIMPLE CORRELATION AND REGRESSION COEFFICIENT AMONG PARAMETERS IN JASMINE (*Jasminum sambac* L.) DURING OFF SEASON PERIOD

Abstract

Jasmine (*Jasminum sambac* L.) stands first among the fragrant loose flowers. India is one of the centre of origin of jasmine. In the present investigation, staggered pruning has been carried out to enhance the flower yield during off-season period (December to March). Data on various growth and yield component variables (X_1–X_{12}) were subjected to correlation coefficient with flower yield (Y) and concrete content (Y). The results showed that the number of flower per plant had the highest and positive association with flower yield (r=0.828**). The positive and significant "b" coefficient was also observed with (b=0.367**) growth and yield attributes. Hence, the regression equation to predict the flower yield would be Y= a + 0.367**. The leaf area was found to be highly correlated with concrete content (r=0.856**); whereas the regression coefficient is 0.895**. with one per cent significant. Therefore, the regression equation would be Y= a + 0.895x. Hence, it could be concluded from the present investigation that leaf area and number of flowers per plant are the important parameters to increase the flower yield and concrete content respectively.

Key words: Jasmine, off season, correlation, regression, pruning.

1. INTRODUCTION

Floriculture is a growing market and quality flower production is an important aspect to meet the demand during the pick period. A loose flower like Jasmine occupies a prominent place in the Indian commercial flower market not only due to attractiveness but also fragrance. Jasmine name is originally derived from a Arabic word Jessamine (Bailey, 1947) and in Persian language, it means fragrance. Jasmine spp cultivated in West Bengal, Sikkim, and Jaintia hills, tropical North West Himalayas, Assam, Khasia Kashmir, Deccan peninsula, from Travancore to Konkan, Western Ghat, Malabar Coast, Coonor, Niligiris, Palani hills and South Andaman (Bhattacharjee, 1980).

Jasmine is a genus of shrubs and vines in the olive family Oleaceae with about 200 species throughout the world, out of which around 40 species are reported to be growing in India. Jasmine is an important traditional flower crop of our country. The important jasmine cultivars grown in India are Gundu mallige (*Jasminum sambac* Ait), Jaji Mallige (*Jasminum grandiflorum* Linn), Kakada (*Jasminum multiflorum* Burm. F.) and Sooji Mallige (*Jasminum auriculatum* Vanl.). Jasmine is grown for its highly scented flowers (Mourya *et al.*, 2017). Jasmine (*Jasminum sambac* L.) is an important commercial flower crop occupying larger area among the traditional flower crops grown in Tamil Nadu. However, one of the serious limiting factors which affects both jasmine flower growers and the consumers and which is likely to affect commercial production, is that the flowering of all the Jasminum species is seasonal. There are peak and lean productive seasons with consequent gluts and scarcity which affect the price trends greatly (Dhanasekaran, 2019).

The peak flowering period is from March to June (Peak season), where it flowers abundantly, leading to a glut of Jasmine flowers pushing down the price. The prices peak from July to October (lean season) since this period is packed with religious festivals. During November to February (Off season), the arrival of Jasminm sambac flowers in the market is very meagre and the quality of the flowers also declines because of the wide temperature fluctuations occurring in this season, resulting in exorbitant prices (Suganya *et al.*, 2023). Regulation of flowering in jasmine has immense practical value. Timing of the peak flowering to coincide with the time of highest demand and generally modifying the flowering sequence to avoid peak production at about the same time would confer great advantage to the grower and consumers. It is in this respect that the possibility of using plant growth regulators for regulation assumes significance (Kanchana and Jawaharlal, 2019). Plant growth in crops like jasmine can be heavily regulated by pruning. It eradicates the unwanted shoots and diverts that energy towards development of new shoot or flowering in plant. It promotes the emergence and growth of new shoots helps in better ease of intercultural operation and keeping good shape of the plants (Makwana *et al.,* 2024). However, studies on association among attributes and the identification of primary traits for the yield improvement and quality of jasmine flowers are scanty. Hence, the present investigation was attempted.

2. MATERIALS AND METHODS

The experiment was conducted at farmer's field at Ayothiapattinum, Salem district of Tamil Nadu during the period of between July 2016 to April 2018 in *Jasminum sambac* (L.) cv. Ramanathapuram local Gundumalli in Randomised block design with four treatments in main plot viz., P_1 – Pruning during the last week of August, P_2- Pruning during the last week of September, P_3 – Pruning during the last week of October and P_4 – Pruning during the last week of November. The treatments were replicated five times. The plants were spaced at 1.25 M x 1.25 M. Fully grown up two year old plants were selected for the study. The pruning operations were carried out at the level of 45 cm from the ground level. The main objective was to find out the simple correlation and regression coefficient among the growth attributes with yield and concrete content. The observations viz. plant height (X_1), number of primary branches (X_2), number of secondary branches (X_3), leaf area index (X_4) and total dry matter production (X_5) were made at peak flowering stage. The yield and yield attributes viz., number of cymers per plant (X_6), number of flowers per plant (X_7), weight of single flowers per plant (X_7), weight of single flower (X_8), weight of flowers per plant (X_9), number of flowers per cyme (X_{10}), flower bud index (X_{11}), concrete content of flowers (Y) and flower yield (Y) kg/ha were recorded at ten plants per replications during harvest stage. The data on yield (kg/ha) of flowers (Y) were subjected to correlation and regression coefficient with the above mentioned growth and yield components (X_1 –X_{12}). Similarly, the data on concrete content (Y) were also subjected to correlation and regression coefficient with the independent variables (X_1 = X_{12}). The data were subjected to statistical scrutiny as per the procedure given by Panse and Sukhatme (1985).

3. RESULTS AND DISCUSSION

A liner relationship between two variables is a monotonic relationship. Most often the term correlation is used in the context of such a linear relationship between two continuous variable known as Pearson product-moment correlation which is commonly abbreviated as "r" value (Rodgers and Nice wander, 1988). Covariance is similar to the variance but; whereas variance describe the variability of a single variable covariance is a measure of how two variables vary together. This coefficient is dimension less measure of the covariance, which is called such that it ranges from -1 to +1 (Wackerly *et al*., 2008).

The results of the present investigation revealed that irrespective of the treatments, twelve selected dependent variables (x) viz., plant height, number of primary branches, number of secondary branches, total dry matter production, number of cymes per plant, number of flowers per plant, weight of single flower bud, weight of flower bud per plant, number of flowers per cymes and weight of hundred flower bud had positive and significant association with independent variable (y) viz., flower yield **(Table 1).** Among the correlation coefficient, number of flowers per plant recorded the highest positive and significant association (r = 0.828**) with flower yield followed by number of secondary branches (r=0.689**) and weight of hundred flower bud (r= 0.685**). Hence, from the present study, it was clearly evident that the weight of flower per plant is the most important yield contributing character for flower yield in *jasminum sambac* (L.). Therefore, this parameter is most essential for the improvement of flower yield in jasmine. The present findings was corroborated with the results of More (1980) in jasmine and Karuppiah and Senthilkumar (2010) in African marigold.

Regression analysis is a statistical tool to study the nature and extent of functional relationship between two or more variables and to estimate (or predict) the unknown values of dependent variable from the known values of independent variable. The variable that forms the basis for predicting another variable is known as the independent variable and the variable that is predicted is known as dependent variable. There are two regression parameters which are 'a' and 'b'. Hence 'a' is unknown constant and 'b' which is denoted as bxy or byx, is also another unknown constant popularly called regression coefficient. The 'b' determine the slope of the line (Shaban, 2005).

The results revealed that the 12 variables viz., X_1 – plant height, X_2 – primary branches, X_3 – total dry matter production, X_4 – leaf area index, X_5 – total dry matter production, X_6 – number of cymes per plant, X_7 – number of flowers per plant, X_8 – weight single flower bud, X_9 – weight of flowers per plant, X_{10} – number of flowers per cyme, X_{11} – flower bud index and X_{12} – weight of hundred flower bud (Table 2). Out of the 12 independent variables, the number of flowers per plant (b= 0.367**) had recorded positive and significant regression coefficient at one per cent level. Hence, flower yield enhancement is possible in jasmine by increasing the number of flowers per plant (Y = a + 0.367*). However, the highest positive regression coefficient (b= 0.894*) at 5 per cent was recorded by weight of hundred flower bud. Similar result was also obtained by Kalaiman (2017).

The 12 independent variables (X_1 – X_{12}) had been subject to simple correlation coefficient with concrete content of the jasmine flowers. The results of the present study revealed that leaf area (r = 0.856**) was found to be highly significant and positive association with concrete content **(Table 3)**. Hence, any amount of increase in the leaf area could results in increased concrete content of the flowers. This could be probably due to the more photosynthates produced from leaves which later metabolized to concrete content through secondary metabolism. The present observation are in consonance with the earlier report of Binisundar (2011).

The regression coefficient ‘b’ was arrived at between concrete content and above 12 independent variables (Table 4). Similar to the correlation coefficient, the leaf area index was observed to be have highly significant regression coefficient (b=0.895**); whereas the TDMP had week and negative association with concrete content. Hence, to predict the concrete content of jasmine flowers, leaf area could serve as important attributes and therefore, the regression equation would be Y = a + 0.895*. However, it is highly variable dependent upon the environment. Ismail (2019) also obtained variations in the concrete content due to environment and method of extraction.

4. CONCLUSION

From the present study, it could be concluded that simple correlation between (X_1 - X_{12}) 12 growth (independent variable) and yield components with (dependent variable) flower yield (Y) revealed that weight of flowers per plant had positive (r = 0.828**) and highly significant correlation with (Y) flower yield (kg ha^{-1}). With respect to regression coefficients, the number of flowers per plant recorded the highest and positive and signification ‘b’ regression coefficient (b = 0.367**) with yield. The correlation coefficient between concrete content (Y) with (X_1 – X_{12}) 12 growth and reproductive variables indicated that leaf area indeed had positive and significant association (r = 0.856**) with concrete yield. The leaf area also had positive and highly significant regression coefficient value (b= 0.895**). Therefore, it is inferred from the present study that the concrete content could be increased by increasing the leaf area index (Y = a + 0.895*).

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author)s) hereby declare that NO generative Al technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exists.

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Table 1. Correlation between flower yield and growth and yield variables in jasmine

Sl. No.	Variables	Correlation coefficient (r)	p-value
1.	Plant height	0.528**	0.000
2.	Number of primary branches	0.400**	0.001
3.	Number of secondary branches	0.689**	0.000
4.	Leaf area index	0.057	0.637
5.	Total dry matter production	0.418**	0.000
6.	Number of cymes per plant	0.424**	0.004
7.	Number of flowers per plant	0.462**	0.000
8.	Weight of single flower	0.650**	0.000
9.	Weight of flowers per plant	0.828**	0.000
10.	Number of flowers per cyme	0.421**	0.000
11.	Flower bud index	-0.400**	0.001
12.	Weight of hundred flower bud	0.685**	0.000

***and ** indicate significant at 1 per cent and 5 per cent respectively**

Table 2. Regression coefficient between flower yield and growth and yield variables in jasmine

Sl. No.	Variables	Regression coefficient 'b' value	p-value
1.	Plant height	-0.474	0.066
2.	Number of primary branches	0.141	0.522
3.	Number of secondary branches	0.221	0.305
4.	Leaf area index	-0.140	0.076
5.	Total dry matter production	-0.138	0.262
6.	Number of cymes per plant	0.327**	0.000
7.	Number of flowers per plant	0.367**	0.002
8.	Weight of single flower	-0.145	0.656
9.	Weight of flowers per plant	0.412	0.283
10.	Number of flowers per cyme	-0.087	0.770
11.	Flower bud index	-0.191	0.446
12.	Weight of hundred flower	0.894*	0.050

R2 value – 0.828 F value -23.59**

***and ** indicate significant at 1 per cent and 5 per cent respectively**

Table 3. Correlation between concrete content and growth and yield variables in Jasmine

Sl. No.	Variables	Correlation coefficient (r)	p-value
1.	Plant height	-0.085	0.478
2.	Number of primary branches	0.009	0.943
3.	Number of secondary branches	-0.066	0.579
4.	Leaf area index	0.856**	0.000
5.	Total dry matter production	-0.240*	0.050
6.	Number of cymes per plant	-0.535**	0.000
7.	Number of flowers per plant	0.061	0.612
8.	Weight of single flower	-0.106	0.374
9.	Weight of flower buds per plant	0.120	0.314
10.	Number of flowers per cyme	0.078	0.510
11.	Flower bud index	-0.003	0.981
12.	Weight of hundred flower bud	-0.105	0.380

*** and ** indicate significant at 1 per cent and 5 per cent respectively.**

Table 4. Regression between concrete content, growth and yield variables in Jasmine

Sl. No.	Variables	Regression coefficient (b)	p-value
1.	Plant height	0.595	0.024
2.	Number of primary branches	-0.897**	0.000
3.	Number of secondary branches	0.343	0.121
4.	Leaf area index	0.895**	0.000
5.	Total Dry matter production	-0.065	0.605
6.	Number of cymes per plant	0.001	0.997
7.	Number of flowers per plant	-0.302*	0.01
8.	Weight of single flower bud	0.286	0.388
9.	Number of flower buds per plant	0.343	0.380
10.	Number of flowers per cyme	0.508	0.095
11.	Flower bud index	0.055	0.828
12.	Weight of hundred flower bud	-0.854*	0.050

R2 = 0.947

F value = 72.08**

*** and ** indicate significant at 1 per cent and 5 per cent respectively.**