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RELATIONSHIP OF SOME QUANTITATIVE TRAITS WITH THE YIELD OF PINEAPPLE

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Pineapple is one of the most important commercial fruit crops of the world. In India it is largely cultivated in Assam and Kerala. It is a good source of Vitamins A, B and C. The crop has a very promising export value and can be grown in relatively less fertile soils where the major crops cannot be raised. The fruit yield of pineapple depends on several quantitative traits. An attempt has been made in the studies to explore some of the major plant characters associated with the fruit yield of pineapple.

Materials and Methods

A random sample of 263 plants of pineapple of the 'Kew' variety was selected for the study from the bulk crop planted at the Pineapple Research Centre, Vellanikkara. Observations on number of leaves (x_1), length of 'D' leaf (x_2), width of 'D' leaf (x_3), weight of crown (x_4) and weight of fruit (x_5) were recorded.

Data on the number of leaves and dimensions of the leaf were collected at the time of flowering. Simple correlation coefficients of all four plant characters with yield were calculated. Partial correlation coefficients of yield with number of leaves, length of 'D' leaf and width of 'D' leaf were also obtained. A multiple regression equation of the form $Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + e$ was fitted according to the method of least squares. The partial regression coefficients were tested for significance.

Results and Discussion

The simple linear correlation coefficients of different plant characters with the yield of Pineapple are given in Table 1.

Table 1

Correlation matrix of different plant characters in pineapple

	Y	X_1	X_2	X_3
X_1	.75**			
X_2	.50**	.69**		
X_3	.55**	.71**	.81**	
X_4	.62**	.87**	.52**	.45**

** indicates statistical significance at P = 0.01 level.

The correlation coefficients of all plant characters with yield were significant. These characters were also inter-related. It is interesting to know whether the association of a particular character with yield is solely due to its relationship with another character which is also correlated with yield. With this object in view the partial correlation coefficients have been worked out Table (2).

Table 2

Partial correlation **coefficients of yield with various quantitative traits in** pineapple

Symbol	Partial correlation coefficient	Symbol	Partial correlation coefficient
$r_{y1.2}$	0.646**	$r_{13.2}$	0.646**
$r_{y1.3}$	0.612**	$r_{12.3}$	0.279
$r_{y2.3}$	0.112	$r_{y1.23}$	0.637**
$r_{y2.1}$	0.037	$r_{y2.13}$	0.076
$r_{y3.2}$	0.285		
$r_{y3.1}$	0.069	$r_{y3.12}$	0.075

Significant at 0.01 per cent level.

The partial correlation coefficient of yield on number of leaves ($r_{y1.23}$) was found to be significant. On the contrary, the length and breadth dimensions of the leaves failed to show any significant relation with yield when the effect of the variation in number of leaves was eliminated. Thus it is evident that the major variable contributing to larger part of variation in fruit yield is the population of leaves per plant. This fact can **also** be verified by referring to Tabe 3. Similar results have been reported with other crops like Sweet Potato Shanmugam & Ramaswamy, 1973) and Grapes (Winkler, 1930).

A simple linear regression equation of yield on number of leaves was fitted. It is of the forms $Y = .543 + .018X$ ($R^2 = 56\%$). The equation gives a statisfactory fit to the data and can be used for the purpose of prediction. The effect of incorporating more variables to the linear regression model was also examined. The multiple regression equation of yield on the different quantitative traits is given below.

$$Y = .1054 + .0129X_1 - .0247X_2 + .5285X_3$$

Table 3

Relationship between number of leaves and yield of pineapple

Size group	No. of plants	Average fruit weight (kg)
15—24	4	.76
25—34	91	.97
35—44	78	1.23
45—54	30	1.53
55—64	21	1.82
65—74	23	1.98
75—84	9	1.87
85—94	7	1.88

This equation also gives a good fit to the data (Table 4.) About 57.7% of the variation in yield can be explained by the above multiple regression equation.

Table 4

Analysis of variance of regression of yield on certain quantitative traits in pineapple

Source	S. S.	df	M. S.	F
Regression	27.67	3	9.221	117.81**
Error	20.27	259	0.078	
Total	47.94	262		

The partial regression coefficient of yield on number of leaves was found to be .0129 and was statistically signifficant. It showd that an increase of one leaf at the time of flowering would be followed on the average by an expected increase of 13 grams in fruit yield, if all other factors remained constant at their mean levels. The dimensions of the leaf was not correlated with yield for plants having a fixed number of leaves.

The correlation coefficiant between fruit weight and crown weight was found to be 0.62 and was significant. Further a correlation coefficient between fruit weight and crown weight expressed as percentage of fruit weight

Table 5

Relationship between fruit weight and relative percentage crown weight in pineapple

Size of fruit	Crown weight as percentage of fruit weight
Small (less than 1 kg)	22.2
Medium (1—1.5 kg)	19.8
Large (above 1.5 kg)	14.2

was also calculated. This correlation was found to be negative and highly significant (r = —.66). It showed that percentage crown weight in relation to fruit weight decreased with increase in fruit weight. So it is more profitable for the consumers to buy larger fruits than smaller ones as the usual practice is to weigh the fruit along with its crown. This fact is self evident from Table 5. The study points out the necessity for developing technologies to supress the growth of crowns from the initial stages for getting fruits of optimum size.

Summary

Simple and partial correlation coefficients of certain quantitative traits with yield of pineapple were calculated. Number of leaves was found to be positively correlated with yield. Dimensions of the 'D' leaf did not show any significant association with yield in the case of plants having a fixed number of leaves. A multiple regression equation was fitted for predicting the expected yield of pineapple from a knowledge of other quantitative traits. The crown weight had a linear relation with fruit weight, but when it was expressed as a percentage of fruit weight the correlation turned out to be negative.

സംഗ്രഹം

കൈതച്ചക്കയിൽ ചില പരിണാത്മകസ്വഭാവങ്ങൾക്ക് ഉൽപാദനവുമായുള്ള ബന്ധം മനസ്സിലാക്കുന്നതിന് നിർദ്ദിഷ്ട സ്വഭാവങ്ങളും, വിളവുമായുള്ള ലഘുരേഖിക സഹബന്ധഗുണാംകങ്ങളും കണക്കാക്കുകയുണ്ടായി. ഇലകളുടെ എണ്ണത്തിനും കൈതച്ചക്കയുൽപാദനത്തിനും ഗണനീയമായ സ്വാധീനമുള്ളതായി ദത്തങ്ങൾ സൂചിപ്പിച്ചു. ചെടിയിലുള്ള ഇലകളുടെ എണ്ണം വർദ്ധിക്കുന്തോറും ചക്കയുടെ തൂക്കം കൂടുന്നതിനുള്ള പ്രവണത നിരീക്ഷിക്കുകയുണ്ടായി. 'D' ഇലയുടെ നീളവും വീതിയും ഉൽപാദനത്തിനും എന്തെങ്കിലും പ്രാധാന്യം ചെലുത്തുന്നതായി പ്രകടമായി തെളിയിക്കുന്നില്ല. കൈതച്ചക്കയുടെ "മുകൾച്ചിനപ്പി"ന്റെ തൂക്കവും വിളവുമായി ധനസഹബന്ധം നിലവിലുണ്ട്. എന്നാൽ മുകൾച്ചിനപ്പിന്റെ തൂക്കത്തെ ചക്കയുടെ തൂക്കത്തിന്റെ ശതമാനക്കണക്കിൽ വ്യംജനിപ്പിച്ചാൽ പ്രസ്തുത പരിമാണവും ഉൽപാദനവുമായുള്ള സഹബന്ധം ഋണാത്മകമാകുന്നു. ചക്കയുടെ തൂക്കം പ്രവചിക്കുന്നതിനുള്ള ഒരു സമാശ്രയണ സമീകരണവും നിർധാരണം ചെയ്യുകയുണ്ടായി

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