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ESTIMATION OF YIELD WITH ITS DIFFERENT PARAMETER BY IMPLICATION OF BIOMETRICS FOR CHHATTISGARH PENINSULAR ZONE

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ABSTRACT

The present study has been made on Sugarcane ACRIP voluntary centre, which is the experimental farm of S. K. College of Agriculture and Research Station, Kawardha, Kabirdham, for early sown sugarcane during cropping season 2014-15. The location of the experimental field is 22'15'' N latitude, 82'48'' E longitude and 280 MSL Altitude. Average rainfall for this region is 850 mm. The study has been made for the well known peninsular zone of Chhattisgarh. Total 16 genotypes (Thirteen genotypes from outside Chhattisgarh and three standards) were grown in RBD with two replications. The data on sugarcane has been collected at the time of sowing to harvesting on different parameters during the sugarcane crop growing season of Chhattisgarh. The correlation coefficient has been calculated for Growth attributes and quality Parameters and regression equation has been also generated for the same. This regression equation can be used as prediction equation. Maximum Correlation between yield attribute and yield was plant height and yield i.e. 0.55 and minimum was cane yield and diameter in cm (0.01). Two regression equations are developed. First equation developed for yield and their attributes and second equation for yield and their quality parameters. Second equation was significant at 1% level along with 75% R^2.

KEYWORDS: Cane Yield, Correlation Coefficient, Growth Parameters Quality Parameters and Regression Equation

INTRODUCTION

Sugarcane (*Saccharum spp. hybrids*) is an important agro-industrial commercial crop which plays vital role in national economy by contributing 0.67 per cent to GDP because of its wider adaptability over varying agro-climatic condition and also unique among agricultural crop in the sense that a number of succeeding cane crops are raised from a single planting which is an integral component of sugarcane production system. In India more than 50 to 55% of sugarcane acreage is occupied by ratoons, which are often poor yielder than the plant cane due to non adoption of improved agricultural technologies. Maximum area covered in 2012-13 was 22.12 followed by 9.37 and 4.25 lakh ha by Uttar Pradesh, Maharashtra and Karnataka respectively. The state wise production was same in the year 2012-13, (http://dsd.dacnet.nic.in/APY-website.pdf 2014). Therefore, even a small improvement in ratoon, productivity would add considerably to overall sugarcane production in the country and benefit cane growers by vacating the fields earlier for sowing of wheat and other Rabi crops timely and mill owner's by providing mature cane in early crushing period. Thus the ratoon crop often gives better yield, quality and sugar recovery than plant cane. Excessive tillering in ratoon crop is a desired character but all tillers may not be productive with proper amount of juice. In order to reduce the number of excessive tillers and converting them into millable cane, earthing up plays an important role in maintaining the growth, yield and juice quality of the sugarcane plant and as well as ratoon. Besides, it has added advantages in terms of pruning/ cutting of old roots, moisture conservation, addition of organic matter, enhanced availability and uptake of plant nutrients,

efficient utilization of solar radiation, suppression of weeds and preventing canes from lodging (Yadav and Shukla, 2008). Cane crops as well as ratoons both are highly exhaustive crop having higher demand for nitrogenous fertilizer because of shallow root system, decaying of old roots, sprouting of stubble buds and immobilization of nitrogen (Lal and Singh, 2008). It is, therefore, 20-25 per cent more nitrogenous fertilizer was recommended over 150 kg N ha^{-1} (recommended dose of nitrogen for ratoon crop).

A lot of work has been done by the different scientists in different part of the country, but no work has been done by the scientist for this region. The first attempt has been made by the scientists for the sugarcane under the peninsular zone of India. This is the beginning of work on sugarcane for this zone, so, there is need for the development of suitable varieties for rationing in relation to juice recovery, insect resistant, disease and pest resistance along with the higher yield.

MATERIAL AND METHODS

The present study has been done under the C.G. Plain Zone of Chhattisgarh. The thirteen genotypes and three standard of early group sugarcane were evaluated in the Randomized Completely Block Design with two replications for their yield performance and other yield attributing characters Viz. Plant Height (cm), Nodal Length (cm), Weight of single cane (kg) and Cane Yield (Q/ha) *etc*. during *Rabi* Season 2014-15. The genotypes of sugarcane were collected from Central Sugarcane Research Station (CSRS) (MPKV), Padegaon (Maharashtra) and local variety from farmer's field. The observations taken on biochemical analysis *viz.,* Brix percentage, Pol percentage, purity percentage and sucrose %

The Correlation Coefficient between yield and different yield attributing characters and Correlation Coefficient between yield and different biochemical characters has been calculated by Karl Pearson's Correlation Coefficient (Pearson, 1895)

$$r = \frac{COV(X,Y)}{\sigma_X \sigma_Y}$$

Where,

COV is Covariance between X and Y.

σ_X σ_y is the Standard Deviation of X and Y.

The prediction equation has been used for the calculation of the production (Pre harvest) of Sugarcane if the area constant for next year:

$$P = a + bA$$

Where,

P= Yield (in million tonnes)

a = Constant

b = Regression coefficient

A= Area (in million hectare)

RESULTS AND DISCUSSIONS

The Table 1 revels that the Correlation Coefficient between yield and their growth attributes ranging between -0.01 to 0.55. The minimum and negative correlation found between cane yield (q/ha) and diameter (cm). Higher correlation indicates between cane yield and plant height which is 0.55 followed by 0.35 and 0.18 i.e. nodal length and weight of single cane respectively. The Correlation Coefficient within growth attributes is ranging from 0.15 to 0.82. Maximum correlation is 0.82 between weight of single cane (Kg) and diameter (cm).

Table 2 indicates that the correlation coefficient between cane yield (q/ha) and different quality parameters Viz. Juce %, Brix %, Pol %, Purity %, Sucrose % (in Juice). The positive and maximum correlation coefficient indicates between yield and Brix %, i.e. 0.25 followed by Juice % (0.21) and minimum in purity % (-0.09). The correlation coefficient within parameters are found positive and maximum in Brix % and Pol % i.e. 0.99% followed by 0.85, which is between Pol % and Purity %. Minimum and negative correlation coefficient is found between Juice % and Brix% i.e. -0.13.

The prediction equations developed in Table 3. Two equations developed on growth attributes and quality parameters respectively. First equation developed on growth attributed that found non- significant and the R^2 of the model is 56.5 %. The value of R^2 for the model is 75% which is positive and significant at 5% level.

Our result is on the same way of the result of hemalatha (2015) who reported that the sugar % and other quality parameters play the role significantly on cane yield. Similar findings reported by Roodagi ET. al. (1999) for Dharwad district, experiment contacted in split plot design, chohan ET, al. (2012) reported that CRD field experiment is also applicable for 9 treatments and 3 replication, for the NSCRI Thatta. Sajjad and Khan (2009) use the genetic parameters viz. genetic diversity, mahalanobis D2 along with quality parameters for Faisalabad district of Pakistan. Tsado ET. Al. Reported that affect of sources and levels of phosphorus on yield and quality of sugarcane in wuggi, kilometre 16, Bida-Makwa Road, Niger State, Nigeria under 2x 4 factorial design.

Udaykumar *ET. al.* (2014) reported under study the effect of fertilisation on yield and quality of ratoon sugarcane variety Co 86032 at Palani Chettipatti village at Theni district, Tami Nadu, India. The soil of the experimental field was sandy clay loam with slightly saline and free of harmful salts. The soil was low in organic carbon and available nitrogen and high in available phosphorus and potassium. The treatments comprising recommended dose of fertiliser in different levels of NPK with combinations of zinc, sulphur, bio-compost and bio-fertilisers. The highest cane yield recorded in treatment received NPK based on soil test and the highest sugar yield and better juice quality recorded in treatment receiving bio-compost and bio fertiliser along with recommended dose of NPK.

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APPENDICES

Table 1: Correlation Coefficient between Yield and their Growth Attributes

	Cane Yield (Q/ha)	Plant Height (CM)	Nodal Length (CM)	Single Cane Weight (KG)	Diameter (CM)
Cane yield (Q/ha)	1				
Plant height (CM)	0.55	1.00			
Nodal length (CM)	0.35	0.74	1.00		
Single cane Weight (KG)	0.18	0.46	0.33	1.00	
Diameter (CM)	-0.01	0.15	0.18	0.82	1.00

Table 2: Correlation Coefficient between Yield and their quality Parameters

	Cane Yield (Q/ha)	Juice %	Brix%	Pol%	Purity%	Sucrose% Juice
Cane yield Q/ha)	1					
Juice %	0.21	1				
Brix%	0.25	-0.13	1			
Pol%	0.17	-0.09	0.99	1		
Purity%	-0.08	0.07	0.75	0.85	1	
Sucrose% (Juice)	0.17	-0.09	0.99	0.99	0.85	1

Table 3: Prediction Equations

	Equation	R^2	Significance of Model
1.	Y=201.77 + 4.61454 PH -18.1433 NL -16.5322 WSC -76.332 D	56.5%	0.33 (NS)
2.	Y= -245983 +40.589 J %+9761.31 B%-11915.8 P% +2987.253 Pu%+0.01 S%	75%	0.04*

*Significant at 5%.

PH = Plant height (CM) NL = Nodal length (CM) WSC = Single cane Weight (KG), D = Diameter (CM), J % = Juice %, B% = Brix%, P% = Pol%, Pu% = Purity%, S% = Sucrose% (Juice)