Agric. Res. J. Kerala, 1983, 21 (2), 87—90

RELATIONSHIP OF TOTAL TILLERS TO EFFECTIVE TILLERS IN SOME MEDIUM DURATION RICE VARIETIES

Studies have been made by several authors on the yield contributory factors in rice. Most of them observed effective tillers as a major yield component. A significant positive correlation was found between yield and number of effective tillers per hill by many workers. Narasimga Rao (1937) and Ramiah (1953) recorded highest correlation between yield and effective tillers per clump. In the case of some late maturing varieties of rice Rao *et at.* (1980) reported similar result. An attempt was made here to study the ratio pattern of total tillers to effective tillers in certain rice varieties of medium duration grown according to package of practice recommendations of the Kerala Agricultural University.

Five medium duration rice varieties Jyothi, Bhadra, Jaya, Bharathy and IR 8 were chosen for the study. Thsse varieties were planted in randomized block design, with three replications and with spacing of 15 x 15 cm in plots of size 3 x 3 m^2 Forty plants from each plot were selected at random to record the observations on total tillers (x) and corresponding effective tillers (y). Total tillers were counted just before booting stage and effective tillers were recorded at maturity. The ratio of effective tillers to total tillers was found out for individual observations. Geometric mean of ratios was worked out as a measure of central tendency for each variety. In order to investigate the nature of the ratio it was examined whether y is proportional to x or y/x takes a constant value (k) for each variety. The principle of sign test in non-parametric method (Gupta and Kapoor, 1975) was used for this purpose. Considering the sample of our study consisting of n paired observation (kxi, yi) $i = 1, 2 \ldots\ldots n$ drawn from two populations with probability density function f (kx) and f (y). Then the null hypothesis to be tested is $f(kx) = f(y)$. Taking the deviations $kxi - yi = di$ $(i = 1 \ldots\ldots n)$, when the hypothesis is true kxi, yi constitute a random sample of size two from the same population since the probability that first of the two sample observation exceeds the second is the same as that of the second exceeding first and hypothetically the probability of a tie is zero. Hence the hypothesis can be restated as $P[(kxi - yi) > 0 = P(kxi - yi) < 0] = \frac{1}{2}$

Let ui = 1 if $kxi - yi > 0$
= 0 if $kxi - yi < 0$

Since ui's are independent $U = \sum_{i=1}^{n}$ ui is the total number positive deviation is a binomial variate with parameter n and P. Let the number of positive deviation be k, then under hypothesis $P(U \leqslant K) = \sum_{i}^{k} \binom{n}{r} p^r q^{n-r} = P$ where $p = q = \frac{1}{2}$ and the hypothesis can be excepted or rejected according to the value of P. The total number

of positive deviation kxi—yi was found out for each variety. **Here** the sample size n = 120 the variable U can be considered asymptotically normal with E (u) = np and variance npq = n/4. Hence the test criterion used was $z = \frac{u - E(u)}{\sqrt{Var\ (u)}}$ is N (0, 1).

Linear regression lines of y on x were fitted for the varieties (Snedecor and Cochran 1967). The regression coefficients were tested for significance and a comparison of regression lines was also made to study the intervarietal homogeneity of effective tillers: total tillers.

The ratio obtained for each varieties (Table 1) was tested as described above and it was observed that the ratio was constant for the varieties Bhadra, Jaya and Bharathy only. Highly significant regression coefficient for all varieties (Table 2) indicated strong dependence of effective tillers on the number of total tillers. A significant f value for slope and elevation (Table 3} revealed that the regression lines are different. This supports the result already obtained that the effective: total tiller ratio is not of constant nature for medium duration varieties.

The ratio of effective tillers to total tillers was found to vary with varieties within a range of 0.75 to 0.95. It wasn't observed to take a constant value for Jyothi and IR 8.

Table I

The effective/total tiller ratios of rice varieties with corresponding critical ratios for normal test

Variety	Ratio y/x	Critical ratio for normal test	Inference
Bhadra	0.75	0.7303	Constant
Jaya	0.76	0.5477	"
Bharathy	0.94	2.1909	"
Jyothy	0.84	5.2946	Not constant
IR 8	0.76	2.7386	"

y = effective tillers/clump
x = total tillers/clump

The author is grateful to Dr. P. U. Surendran. Professor of Statistics, College of Veterinary and Animal Science, Mannuthy, Sri. N. Rajappan Nair, Associate Prof. R. R. S., Moncompu and to Smt N. Rema Bai, Assistant Professor, R. R. S. Moncompu for helps rendered during this investigation.

Table 2

Test of significance of regression coefficients

Variety	Regression equation	SS due to regression	df	MSS due to regression	Deviation from regression	df	MD from regression	F
Bhadra	y=0. 498+0.7327 X	993.87	1	993.87	189.83	118	1.608	618.00
Jaya	y=0. 383+0.7309 x	295.59	1	295.59	93.73	118	0.794	372.22
Bharathy	y=0. 641+0.8398 X	176.13	1	176.13	124.74	118	1.057	166.69
Jyothy	y=1.2142+0.8860x	1501.77	1	1501.77	154.73	118	1.311	1145.51
IR 8	y=0. 840+0.6677X	36867	1	362.51	63.16	118	0.535	677.58

y = effective tillers/clump
y=total tillers/clump

Table 3

Comparison of regression lines of effective tillers on total tillers

Variety	df	x^2	xy	y^2	Deviation from Regression b	df	SS	MSS
Bhadra	119	1853.12	1357.75	1183.70	0.732	118	189.83	1.608
Jaya	119	553.99	404 93	38993	0.730	118	93.73	0.794
Bharathy	119	249.98	209.93	300.87	0.839	118	124.74	1.057
Jyothy	119	1911.20	1695.00	1656.50	0.886	118	154.73	1.311
IR 8	119	813.93	543.50	425.67	0.667	118	63.16	0 535
Total						590	626.19	1.116
Pooled (W)	595	5382,21	4211.11	3956.07	0.782	594	662.98	1.116
Difference between slopes						4	36.79	9.197
Between (B)	4	4551,79	3019.89	2083.93				
W+B	599	9934	7231	6040	0.727	598	783·06	
Between adjusted means						4	120.08	30,020

$$\text{Comparison of slopes } F_{(4,590)} = \frac{9.197}{1.061} = 8.668^{**}$$

$$\text{Comparison of elevation } F_{(4,594)} = \frac{30.020}{1.116} = 26.89^{**}$$

** Significant at 0.01 level

സംഗ്രഹം

ക്രമാനുസാരമായ കൃഷിരീതിയിൽ വളർത്തപ്പെട്ടതും മദ്ധ്യകാല മൂപ്പുള്ളതുമായ ചില നെല്ലിനങ്ങളിൽ പെടിയുടെ മൊത്തം ചിനപ്പുകളുടെയും കതിർവന്ന ചിനപ്പുകളുടേയും എണ്ണങ്ങൾ തമ്മിലുള്ള അനുപാതസംഖ്യ 0.75ffi^mraJ0.95 വരെ വ്യത്യാസപ്പെടുന്നതായി കണ്ടു. ജ്യോതി, ഐ. ആർ. 8 എന്ന ഇനങ്ങളിൽ ഈ അനുപാതം സ്ഥിര സ്വഭാവമുള്ളതല്ലെന്നും കാണപ്പെട്ടു.

Rice Research station
Moncompu, Kerala

P. R. Krishnakumari

References

Gupta, S. C., Kapoor, V. K. 1975 *Fundamental of Mathematical Statistics.* 4th ed. Sultanchand & Sons, Daryagnj, pp 845

Narasinga Rao, M. B. V. 1937. A note on a few experimental observation in Rice Research Station, Berhampore (Orissa). *Indian J. agric. Sci.* 7: 733–744

Ramiah, K. 1953. *Rice Breeding and Genetics,* Indian Council of Agricultural Research, New Delhi, Sci. Monograph, No. 19

Rao, A. V., Rao, C. S. and Prasad A. S. R. 1930. Path coefficient analysis in some late maturing rice varieties. *Indian J. agric. Sci.* 50: (2) 135-138

Snedecor, G, W. and Cochran, William G. 1967. *Statistical Methods.* Oxford and IBM Publishing Company, 6th ed.