

The specific name has been given after Dr. Gurdip Singh of Birbal Sahni Institute of Palaeobotany, who collected the specimen.

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PLANT TYPE AND HARVEST INDEX IN RAGI (*ELEUSINE CORACANA* GAERTN.)

THE importance of plant type for high productivity has been demonstrated in crops like paddy and wheat. Its importance in *ragi* improvement work cannot be ignored. Plant type is also related to harvest index. A suitable plant type with a higher harvest index has to be evolved. Harvest index is the grain weight expressed as a percentage of the total dry weight of the plant cut above the ground level. This is usually very low and is in the range of about 20-30%. This index, however, is very much subject to environmental control. This means that with the available varieties, only about one-fourth of the dry matter synthesized is in the form of grain, while three-fourths of the dry matter is in the form of the comparatively less valuable straw. This assumes special significance in *ragi*, where while the grain is very nutritive, the straw is known to be of

indifferent fodder value. It would then be particularly desirable to increase the value of the harvest index in *ragi*. This aspect of amelioration of the *ragi* crop had been receiving active attention in the Division of Botany during the past three years and the encouraging results obtained are presented in this note.

As tall plants tend to increase straw weight, plants of medium height, or short plants or even dwarf plants will have to be preferred. Large number of primary or basal tillers would also tend to lower the harvest index and hence cannot be considered a desirable character. Large number of secondary or nodal tillers would also have a similar effect. However, a few (2-4) fruiting branches arising right near the top may add to the grain yield significantly without proportionate increase in straw weight. Leaves with upright habit increase the effective area of the leaf and are conducive to increased yields and hence are to be preferred. Also a large duration of head filling would help to increase the grain weight as compared to straw weight. The plant body should be compact so that a larger than usual population can be effectively raised in unit area. With these objectives in view, single plant selections were made in the World Germ-plasm collection of *ragi*. These were tested in preliminary row trials with suitable checks. The more promising of these were put in a small-scale replicated trial at Delhi during *Kharif* 1965. The data are presented in Table I. Selection 2 has a very desirable plant type; it has 2-4 synchronised tillers, compact habit, rather erect leaves and a long duration of head-filling, a high plant

TABLE I
Performance of *ragi* selections during *Kharif* 1965

Selection No.	Description of Plant type	Per plant yield of		Percentage increase over test check	Harvest index
		Grain (gm.) (Average of about 80-110 plant from two replications)	Fodder (gm.)		
Sel. 2	Normal height; 2-4 basal tillers; a few nodal tillers right at the top harvesting to be done two times	19.0	43.0	(46.2)	30.7
Sel. 1	Medium height, 2-4 basal tillers, synchronised tillering mid-late maturity; shortened peduncle	17.1	37.6	(31.6)	31.3
Sel. 3	Dwarf; 2-4 basal tillers; profuse nodal tillering; harvesting to be done 2-3 times	14.2	28.1	(9.2)	33.6
Sel. 4	do.	13.3	32.5	(2.3)	29.0
T. 36 (Control)	Short; 2-4 basal tillers; profuse nodal tillering harvesting to be done twice	13.0	31.7	..	29.1
V.R. 7 (Control)	Medium height; 2-4 basal tillers; nodal tillering present; harvesting to be done twice	11.6	30.3	..	27.7
Purna (Control)	do.	10.8	35.6	..	23.3
Co. 7 (Control)	do.	8.8	5.7	..	13.4

yield (31.5% more than the best check) and a comparatively high harvest index. Selection 1, also has a desirable plant type; it has 2-4 synchronised tillers, but also develops near the top, a few nodal tillers which mature a little later, thus making a second picking necessary. This has given the highest per plant yield (46.15% more than best check). This has a comparatively high harvest index. Because of their compact habit, a larger than normal population of these selections can be accommodated in unit area, thereby increasing the yields.

Selections 3 and 4, are dwarfs, but have profuse nodal tillering which is not a very desirable feature. However, they have comparatively a high harvest index and a high per plant yield. This indication of a shift towards grain production in these selections will favourably affect grain yields, while fodder yields may be adversely affected. To some extent, this decrease in fodder yield may be made up by larger populations per unit area. However, a net decrease in fodder yield may result, but will be more than compensated by the increased grain yield. Actually this may lead to the farmers taking to a better and more nutritive fodder crop in such areas. These selections are being tested in large-scale trials at different locations within the country to confirm their superiority.

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OCCURRENCE OF ZEBRA-NECROSIS IN SORGHUM

DURING the study of Sorghum World Collection, consisting of 4027 stocks from 44 countries, grouped into 70 tentative groups⁵ grown at this Institute in 1965-66, a particular type of zebra-stripping, resembling closely that in maize (Giesbrecht² and Horovitz⁴) was observed for the first time. It was identified by the presence of longitudinal chlorotic bands, alternated with normal green tissues of similar length across the width of the leaves (Fig. 2) and sometimes in the marginal region also. In most of the cases the length of the bands was normally 4 to 12 cm. with a maximum of

26 cm. (Fig. 3). The maximum number of bands per leaf was observed to be 8 or 9, while in most of the cases it was usually 2 or 3 confined to the distal half of leaf-blade.

The chlorotic bands gradually became more and more prominent, followed by necrosis, which ultimately led to the rapid drying of the leaves. The necrosis spreads only in the chlorophyll-deficient bands in longitudinal direction (Figs. 1 and 3).



FIGS. 1-3. Fig. 1. Development of necrosis at later stage. Fig. 2. Development of Zebra-stripping. Fig. 3. Maximum length of a necrotic band.

Out of 4027 stocks only 88 lines (2.2%) exhibited zebra-stripping. Among these affected lines 62 (about 70.0%) were from South and Eastern African regions, thereby indicating that the alleles for this character are prevalent in these areas, which are supposed to be the centre of origin and differentiation of cultivated sorghums.

Fungal and bacterial pathogens were ruled out after microscopic examination. Since the disease was not sap-transmissible and the young leaves were unaffected, the virus as a cause of necrosis was unlikely. It is, therefore, non-pathogenic necrosis, controlled by some genetic mechanism.

The observations clearly demonstrate that the necrosis was least frequent (less than 5% of the population) in the species, excepting Sudanense (8.33%) and Nigricans (7.0%). It was most frequent (more than 5% of the popu-