

TABLE I
Relationship between photosynthetic rate (P_o) and some leaf characters in rice

Leaf character	Correlation with P_o (r)*			
	Early	Late	HYV	Pooled value
Chlorophyll (mg. dm ⁻²)	0.574*	0.822**	0.781**	0.742**
Stomatal frequency (number mm ⁻²)	0.536*	0.561*	0.553*	0.550*
Stomatal size ($b \times n \times 10^{-3} \mu\text{cm}^{-2}$)	0.543*	0.607*	0.529*	0.561*
Interveinal distance (μ)	-0.826**	-0.723**	-0.603*	-0.727**
Leaf nitrogen content N_{LA} (mg. dm ⁻²)	0.554*	0.650**	0.806**	0.685**
Specific leaf weight, SLW (mg. dm ⁻²)	0.578*	0.634**	0.687**	0.635**

Significant at 1% (**) and 5% (*) level.

Correlation tests (Table I) showed significant relationship of P_o with all the leaf characters studied especially with that of chlorophyll content (+ ve) and interveinal distance (- ve). The relationship between P_o and chlorophyll has already been fairly established¹². However, such relationship should be viewed with caution as the chlorophyll content though high sharply affects the photosynthetic rates under limited light conditions¹³. The N_{LA} also showed high association with P_o and corroborated similar findings elsewhere³. However, it has been observed that P and K deficient rice plants were poorer in P_o in spite of sufficient N in their leaves¹⁴. Specific leaf weight or the leaf thickness also showed high relationship with P_o as has been reported earlier¹⁵. However, such relationship was found to be not consistent by some workers³. Among the characters studied, stomatal frequency and size showed loose relationship with P_o in all the groups. In general, the relationship of interveinal distance with P_o is consistent among all the groups. It is suggested that smaller distance between veins might help in efficient transport of photosynthates and enhance the rate of CO_2 fixation⁸.

Thus, the interveinal distance might serve as a simple and reliable index in identifying photosynthetically efficient genotypes. So far, the relationship of smaller interveinal distance with photosynthetic efficiency in rice has not been reported.

The authors are grateful to the Department of Atomic Energy, Government of India, for financial assistance to the above investigations.

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TRITICALE STEM RUST FROM INDIA

Triticale is a new plant genus produced artificially by crossing either hexaploid or tetraploid wheat (*Triticum* sp.) with diploid rye species (*Secale* sp.) followed by the doubling of the chromosome complement of the sterile F_1 hybrid. It is generally believed that wheat is resistant to the rust forms which attack rye, and that rye is not attacked by rusts specialized to wheat³. As a result *triticale* could be expected to be resistant to both rust forms. But this expectation has not come true and the cereal rusts (*Puccinia* spp.) are observed on *triticale* and are considered to be the most

serious threat to its production. A lot of work is being done for the improvement of this crop. Recently, during April, 1977 a severe attack of stem rust was noticed on indigenous (TL-29 and TL-193) and Mexican (CIMMYT) material in the Experimental Farm of Punjab Agricultural University, Ludhiana. The disease incidence in the material was as high as 80 to 100%.

The characteristic symptoms observed on triticales were small to large, brown pustules on the stem, leaf sheath (Fig. 1) and leaves. In the highly

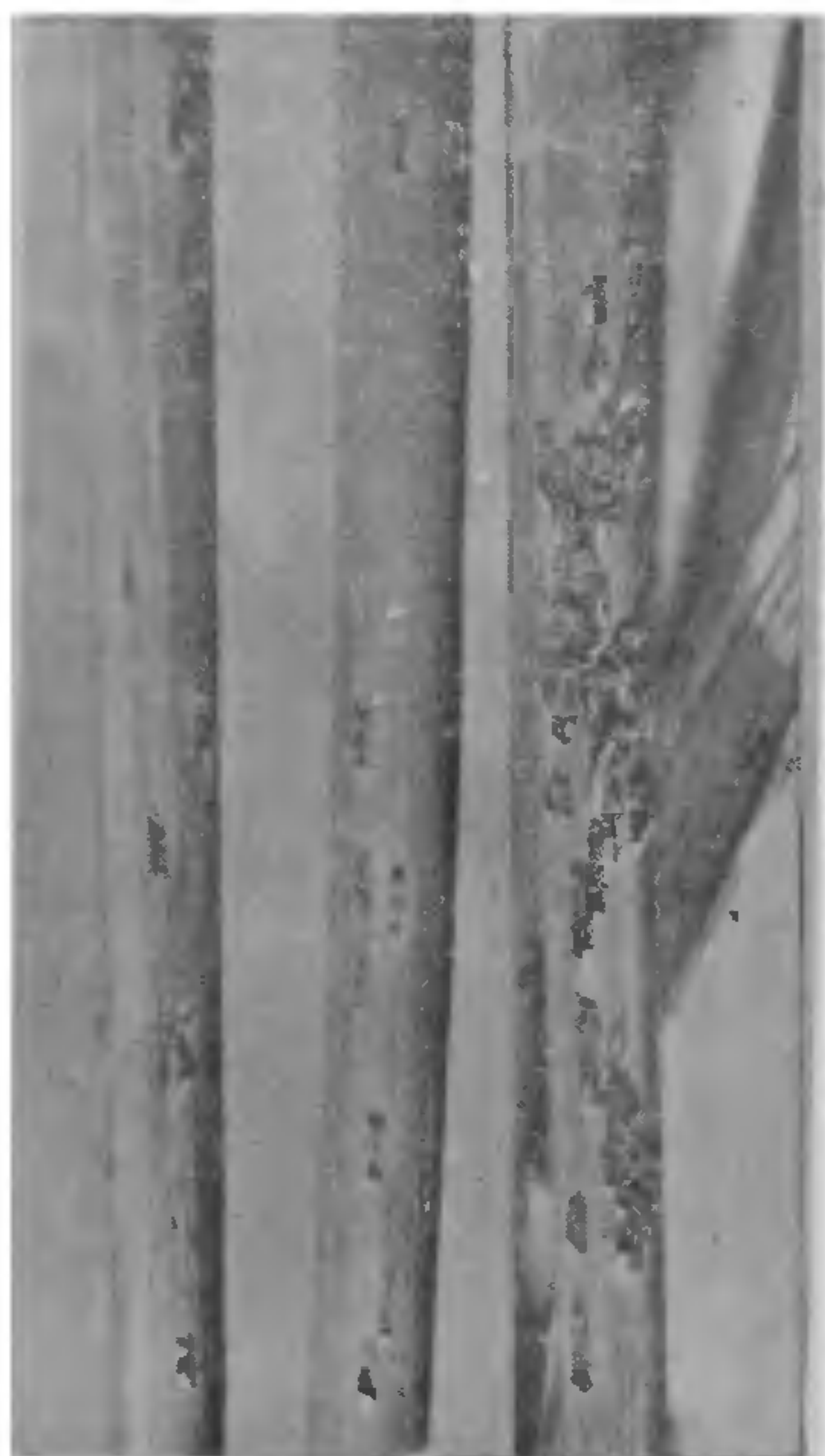


FIG. 1. Rust pustules on triticales.

susceptible material, ears were also attacked. Uredospores were variable in shape ranging from round, oblong, ellipsoid or elongated, thick walled, golden brown, strongly echinulated, $24-53.5 \times 14.5-26.8 \mu$. Teleutospores ellipsoid, oblong, bicelled, constricted at the septum, wall thickened at the apex, smooth, dark brown, $15-24.5 \times 35-60 \mu$. The fungus is identified as *Puccinia graminis* f. sp. *tritici* (Pers) Eriks & Henn.

The triticales (TL-29) and wheat (agra local) were inoculated with freshly collected uredospores from triticales. Ten-day old plants after inoculation were kept in a humidity chamber for 24 hrs. and were transferred to glass house at 25° C. The

characteristic symptoms were observed both on triticales as well as on wheat plants after 15 days of inoculations.

Stem rust has already been reported on *Triticale* in Mexico¹ and Czechoslovakia², but from India it has not been reported so far. Its occurrence and the future potential threat, in India, should also be taken into consideration in the breeding programmes.

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ON THE OCCURRENCE OF ALTERNATIVE GERMINATION IN THE GENUS *PHASEOLUS* L (PAPILIONACEAE)

THE importance of seedling characters have lately been realized and it is only relatively recently that information on seedling characters began to be used for identification purposes^{1,4,5} and even for genetic studies².

Seedlings characters in the Leguminosae have been studied by Burger¹ and Kalyansundaram¹. The latter author surveyed 58 genera and 200 species for the germination character and has shown the occurrence of both types of germination in Papilionaceae and Caesalpinae. In the former, hypogeal germination being more common than the epigeal, and the reverse in the latter, while Mimosae shows epigeal type of germination only.

In this communication, the authors report the occurrence of alternative germination in the genus *Phaseolus* whose epigeal germination is well known.

In Table I data pertaining to different species of *Phaseolus* investigated with regard to the type of germination are listed. Out of the 9 species investigated *P. angularis* and *P. multiflorus* show hypogeal germination and *Phaseolus vulgaris* (Fig. 1-3) as also the six other species show epigeal germination. It may be further noted that even the large number of seedlings tested under the different varieties of *P. mungo*, *P. vulgaris* and *P. aureus* included in the present study show only epigeal type of germination though transitional forms are known to occur³. To find out whether the epigeal