SHORT COMMUNICATIONS

CHROMOSOME LOCATION OF MATURE PLANT LEAF RUST RESISTANCE IN CHINESE SPRING WHEAT*

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Athwal and Watson (1957) reported that the wheat cultivar Chinese Spring W1806‡ possessed a single dominant gene for mature plant resistance to leaf rust (*Puccinia recondita* Rob. ex Desm.) and that this gene was allelic with one of two factors in Uruguay W1064. The second factor in Uruguay, operative in both seedling and mature plant stages, was located on chromosomes 5D(XVIII) (McIntosh, Baker, and Driscoll 1965). Unrau (1950) presented F_2 and F_3 data for crosses involving certain Chinese Spring monosomic lines with the susceptible cultivar Federation 41. His results were inconclusive in associating resistance with a specific chromosome. The behaviour of the Chinese Spring resistance with regard to dominance has been found to vary in different investigations. In addition to the report of Athwal and Watson, Unrau found that the segregation pattern in crosses with Federation 41 indicated that resistance was governed by a single, incompletely dominant pair. On the other hand, Macindoe (1948) reported that a recessive gene for resistance was involved.

In 1964 field sowings at Hawkesbury Agricultural College, N.S.W., the cultivar Hope was, at spike emergence, susceptible to a mixture of leaf rust strains. The Hope chromosome substitution 4A(IV) line in a Chinese Spring background was also susceptible but, in contrast, both the Chinese Spring cultivar and the remaining 20 Hope substitution lines were uniformly resistant. This observation was confirmed in glasshouse studies by comparing adult plant reactions of substitutions 4A and 7A(XI) inoculated with leaf rust strain 162-Anz-1,2,3,4 when the former proved susceptible (Plate 1). Six nullisomic 4A plants obtained from selfed Chinese Spring parents mono-isosomic for one of the 4A chromosome arms were susceptible whilst the disomic control was resistant. This verifies that chromosome 4A was responsible for Chinese Spring mature plant leaf rust resistance. Since mono-isosomic 4A plants of this type were not tested the particular 4A chromosome arm conferring resistance was not identified. The observation that only a single chromosome is responsible for conditioning immunity in Chinese Spring supports the hypothesis of a mono-factorial basis for leaf rust resistance in this cultivar.

We are indebted to Drs. E. R. Sears and W. Q. Loegering for supplying the original seed of the Chinese Spring mono-isosomic line and the Hope substitution lines respectively. Financial assistance from the Commonwealth Wheat Research Council is gratefully acknowledged.

* Manuscript received April 27, 1966.

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‡ W numbers refer to the Sydney University Wheat Accession Register.

References

ATHWAL, D. S., and WATSON, I. A. (1957).—Inheritance studies with certain leaf rust resistant varieties of *Triticum vulgare* Vill. *Proc. Linn. Soc. N.S.W.* **82**: 272–84.

MACINDOE, S. L. (1948).—The nature and inheritance of resistance to stem rust of wheat, *Puccinia graminis tritici*, possessed by several parents. Sci. Bull. N.S.W. Dep. Agric. No. 69.

MCINTOSH, R. A., BAKER, E. P., and DRISCOLL, C. J. (1965).—Cytogenic studies in wheat. I. Monosomic analyses of leaf rust resistance in the cultivars Uruguay and Transfer. *Aust. J. Biol. Sci.* **18**: 971–7.

UNRAU, J. (1950).—The use of monosomes and nullisomes in cytogenetic studies of common wheat. *Sci. Agric.* **30**: 66–89.

LEAF RUST RESISTANCE IN WHEAT

Leaf rust reactions on upper leaves of mature plants of Hope chromosome substitution lines in Chinese Spring wheat. *Left*, line 4A(IV) (susceptible—"4" reaction types); *right*, line 7A(XI) (resistant—";" reaction types). ×2·5.