A PROPOSED MODIFICATION OF THE SYSTEM OF WHEAT LEAF RUST RACE IDENTIFICATION AND NOMENCLATURE

A Committee of North American Wheat Leaf Rust Research Workers[1]

A dynamic, open-end system of wheat leaf rust (Puccinia recondita Rob. ex Desm.) race identification and nomenclature is needed which will serve in studies of the classification and distribution of new or previously undetected factors for virulence and yet retain continuity with past and present epidemiological studies and systematics. Such a system should involve the use of supplemental differential and resistant wheat varieties. The use of additional or supplemental varieties for the identification of certain types of virulence has been suggested before.

Waterhouse (8), in 1932, proposed the use of a supplemental differential for wheat leaf rust, and Vallega (6), Vallega and Favret (7), da Silva (4), and possibly others have since suggested that supplemental differentials would be useful. Loegering and Stakman (3) and Johnson and Green (1) have proposed the use of supplemental differentials for wheat stem rust also, and Stakman and Stewart[2] proposed a method for selecting supplemental differentials and a system of nomenclature for stem rust associated with the use of supplemental differentials. In these proposals the standard differentials were retained.

Simons and Murphy (5), on the other hand, have developed a new independent set of differentials for oat crown rust. This set retains some of the old differentials together with some new varieties and is used with a new key and race numbers. While the use of supplemental or new differentials has furnished valuable information for plant pathologists and plant breeders, their use in wheat leaf rust race identification has not yet been systematized.

The general problems concerned with the use of supplemental differentials in leaf rust race identification and the attendant nomenclature were discussed at a meeting at Stillwater, Oklahoma, in February 1958, and again at Winnipeg, Manitoba, in August of that year. It was concluded that the establishment of a new set of differentials with attendant new keys and race numbers would eventually create the same shortcomings encountered with the standard differentials now in use. The system herein proposed would, therefore, retain the standard differentials and would supplement these with other suitable differential and universally resistant varieties. It was agreed to adopt the methods proposed by Stakman and Stewart[2] for the selection of supplemental differentials but to try on an experimental basis a different system of nomenclature to accommodate the use of supplemental differentials.

Thus there will be three categories of varieties in use in this program:

1. Test varieties. (Varieties being tested as possible supplemental differentials.)
2. Supplemental differentials. (Varieties selected from the "Test varieties" which are useful in differentiating leaf rust virulences not detected by the standard differentials and also varieties which are currently resistant to all leaf rust cultures.)
3. Standard differentials. (Varieties in the set of differentials published by Johnston and Mains (2) in 1932.)

It was further proposed that an attempt be made to establish a uniform group or set of supplemental differentials for use at least throughout North America. Such a set of supplemental differentials will be established only after adequate experience with the test varieties. The varieties suggested for initial testing are listed in Table 1. It is emphasized that this is not a list or set of supplemental differentials, but only a list of varieties that will be tested for possible inclusion in a set of supplemental differentials to be established at a later date. By cooperative agreement, the supplemental differentials so selected may be changed from time to time as the need arises. Additions to the supplemental set will always be made from a list of test varieties that will be under study continually.

A system of nomenclature to be used when the supplemental differentials are used in leaf rust race identification was agreed upon. The name, or designation, of a race will consist of

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[2] Stakman, E. C., and D. M. Stewart. 1957. Taxonomy of Physiologic Races of Puccinia graminis var. tritici. U. S. Dept. of Agr., Agr. Res. Service, Plant Pest Control Div., Coop. Rust Lab. Memorandum. April 10, 1957. Processed.

Table 1. Wheat varieties under test as possible supplemental differentials for wheat leaf rust race identification, January 1959.

Name	C. I. Number	Selection Number
1. Agrus	13228	Purdue 39120A5-3-1-1-1-3
2. Newsar	12530	Purdue 3848A5-5-1-36
3. Waban	12992	Purdue 3369-61-1-1-10R
4. (Honor[2] - Rosen Rye x Yorkwin) x Cornell 595	13078	Cornell 82 a1-2-4-7
5. Wardal	13372	Purdue 4665A2-9-1
6. Sinvalocho	12595	D. I. V. 8385
7. Klein Lucero		D. I. V. 8386
8. Klein Titan		D. I. V. 396
9. Westar	12110	
10. Wesel	13090	
11. Exchange	12635	
12. Rio Negro	12469	
13. Colotana 266/51	13556	P. I. 214392
14. Lee	12488	
15. Aniversario	12578	
16. Transfer, Chinese + Aegilops umbellulata	13483	P54-47.4-6

three parts which will be separated by hyphens. The first part will be a race number determined on the basis of the reaction of the eight standard differentials. The second part will be a designation for the specific set of supplemental differentials. This designation will consist of letters indicating the area of acceptance of the supplemental differential set and a two-digit number indicating the year in which the list of varieties included in the specific supplemental differential set was published. The designation for the uniform set established for North America will be "NA." A local area designation, such as "Okla" is to be used when any local worker establishes a supplemental differential set for his own use that is different from the "NA" set used throughout North America. The list of varieties for the "NA" set of supplemental differentials will be published in the "Plant Disease Reporter" and in "Robigo." No supplemental differential set will be recognized for purposes of nomenclature until the list of varieties in it has been published. The third part of the designation will be a number of a consecutive series used to indicate cultures which produce certain specific reactions on the supplemental set of differentials. The numbers of this consecutive series will be assigned in order of recognition of pathogenically different cultures. Where the "NA" supplemental differential set is used, it will be important that there be a certain individual responsible for assigning numbers. The United States Department of Agriculture, through the person in charge of leaf rust race identification (C. O. Johnston), has agreed to accept this responsibility. Where a local set of supplemental differentials is used, the number will be assigned by the worker who made up and published the set.

Thus, for example, a designation such as 9-NA59-1 would identify a culture recognized as race 9 on the eight standard differentials and as variant 1 on the North American supplemental differential set published in 1959. The designations 15-NA59-1 and 9-NA59-1 would indicate a difference in reaction on the standard differentials, but these cultures would have the same reaction on the supplemental differentials. On the other hand, 9-NA59-2 would differ from 9-NA59-1 only on the supplemental differentials. Such designations will be more complex than previous race numbers but will systematically indicate the phenotypic variation between different cultures as measured by the differentials used.

In the publication of critical research with leaf rust the author should use the complete designation including the race number based upon the eight standard differential varieties, but where the worker deems it expedient, he may publish designations based only on the supplemental differential set.

The system outlined will provide flexibility together with a uniform method of designating variation based upon supplemental differentials.

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