Report of the Ad Hoc Committee on Sunflower Rust by the International Sunflower Rust Committee held September 29-30, 1987 at Frederick, Maryland

Dr. S.-M. Yang, acting as coordinator, and invited investigators working with sunflower rust met at the Foreign Disease-Weed Science Research Laboratory, U. S. Department of Agriculture, Fort Detrick, Frederick, Maryland for two days, September 29-30, 1987.

Those able to attend were (in alphabetical order):

Dr. T. Gulya, USDA, ARS, Sunflower Research Unit, North Dakota State University, Fargo, ND 58105, U.S.A.

Dr. J. K. Kochman, Plant Pathology Branch, Queensland Department of Primary Industries, P. O. Box 102, Toowoomba, 4350 Queensland, Australia.

Ing. Agr. A. Luciano, ACS, Rivadavia 647, 3100 Parana, Entre Rios, Argentina.

Dr. S. Masirevic, Institute of Field and Vegetable Crops, M. Gorkog 30, 21000 Novi Sad, Yugoslavia.

Prof. W. E. Sackston, Department of Plant Science, Macdonald College of McGill University, Ste.-Anne-de-Bellevue, Quebec, Canada H9X 1C0.

Dr. Rama Raje Urs, Dahlgren Co., 1220 Sunflower St., Crookston, MN 56716, USA.

Dr. S-M. Yang, USDA, ARS, FDWSRU, Fort Detrick, Bldg. 1301, Frederick, MD 21701, USA.

It was agreed that the International Sunflower Association should establish a standing committee on sunflower rust, made up of scientists from various countries who are actively working on sunflower rust. The membership may vary with individuals joining and leaving the committee as

their work changes. It is recommended that the initial members be the persons attending the meeting at Fort Detrick.

It was agreed that cultures representing all identified rust pathotypes be submitted to central culture collections for long term storage and as sources of cultures for investigators around the world. Centres suggested are: Fort Detrick, Maryland, under the care of Dr. S-M. Yang; the American Type Culture Collection, Rockville, Maryland, U.S.A.; the Commonwealth Agricultural Bureaux, Farnham Royal, United Kingdom. Individual investigators should maintain their own cultures even after they have been shown to be similar to other identified cultures, as they may prove to be distinct when new differentials are developed.

It was agreed that seed of sunflower lines (genotypes) which have been found useful as differentials should be increased by individuals or institutions in a position to do so, and submitted to centres with facilities for long term storage and distribution to investigators around the world. Centres suggested are: Australia, for materials which have passed through the quarantine process and have been increased there; Dr. Raymond Clark, U.S. Department of Agriculture Plant Introduction Station, ISU, Ames, Iowa 50011; Institute of Field and Vegetable Crops, 21000 Max. Gorkog 30, Novi Sad, Yugoslavia; I.N.T.A. Experimental Station, Pergamino, Province of Buenos Aires, Argentina.

Naming System

The committee decided that at the present it would be more appropriate to use a descriptive system listing all the resistance gene(s) and/or differential(s) attacked rather than a code or a sequential race numbering system. Cultures of rust maintained by individual rust researchers could be

identified or coded by whatever system the individual preferred for his own use. In correspondence and in publications however, the cultures should be identified by both the researchers' own designation and the genes or differential(s) attacked. The North American races currently identified as 1, 2, 3, and 4, would be described as: 0, 2, 1, and 1,2, respectively. Any publications or communications describing new cultures should include information on the resistant genes or differentials on which they have been found to be avirulent. Omission of genes in the designation of a culture implies that such genes and resistant. It is obvious that as new resistant genes or differentials are identified and tested, designation of existing cultures may have to be changed. Therefore, individual researchers are urged to maintain their cultures even after they have verified to be similar with other existing culures. These isolates all infect sources with the R_1 and R_2 gene and the 'a' and 'c' differentials and by omission infer that differentials 'b', 'd' and 'c' are resistant.

Suggested genotypes to be used

Numbers or letters assigned[a]	Genotype	Differential lines[b]
0	r r	S 37-388, Ph 67A-B
1	R_1	F164A-B, CM69RR, CM90RR, S37-388 RR
2	R_2	CM29-3, CM 307-1
a	Unknown	HAR_1, Pergamino 78/287, SAENZ PENA 74-1-2, P386, IMPIRA INTA Sel 5
b	"	HAR_2
c	"	P94
d	"	IMPIRA INTA Sel. 11
e	"	Pergamino 71/538

[a]Numbers are assigned to those differential lines whose genotypes have been determined. Letters are assigned to those differential lines with unknown genotypes.

[b]Differentials in a given group react the same way with the current rust populations studied.

Inoculation Technique

There are a number of factors including environment, and pathogen concentration, which can lead to variability in reaction type. Therefore, we suggest the following standardized inoculation technique be used if a change of race is suspected in a population.

1) Obtaining and using a single uredospore isolate is highly desirable. If that is not feasible, inoculum should be increased from a single uredial pustule to minimize variation in the pathogen. Multiply in isolation to provide sufficient inoculum for the test. If the isolate is discovered on a new line or hybrid, it would be advisable to increase the rust on that line.

2) Grow seedlings of all differential lines under uniform conditions, preferably at 22/18° C day/night temperature and 600 $uEm^{-2}sec^{-1}$ of light supplied in 12 h photoperiods.

3) When the first true leaves are fully expanded, inoculate them with between 200–500 fresh uredospores cm^{-2}, spray with a fine mist of water and place in saturated atmosphere for 16 h in darkness at 20° C. Inoculum may be applied directly to plants or on paper pads, with appropriate spore concentrations, attached to leaves.

4) Replace plants into the environment in which they are grown.

5) Inspect plants daily for reaction to rust and make a final rating 12-14 days after inoculation.

Rating System

The following numerical rating system should be used:

0, no visible reaction

0;, fleck reaction

1, small uredia (0.1-0.2 mm in diameter) in association with flecking and necrosis

2, uredia (0.2-0.3 mm in diameter) which sporulate freely usually with conspicuous chlorosis

3, uredia (0.3-0.4 mm in diameter) which sporulate freely with little chlorosis.

4, uredia (0.4 mm in diameter) which sporulate freely usually with no chlorosis.

0, 0; and 1 and 2 are resistant, 3 and 4 are susceptible.

Acknowledgment

The committee members are grateful to USDA-ARS-FDWSRU, Fort Detrick, Frederick, MD for assistance and providing facilities for the meeting and to their respective funding bodies for financial assistance.

The Committee members also grately appreciated Dr. Browder for explaining the pathogenic race nomenclature within current knowledge of the gene-for-gene relationship.