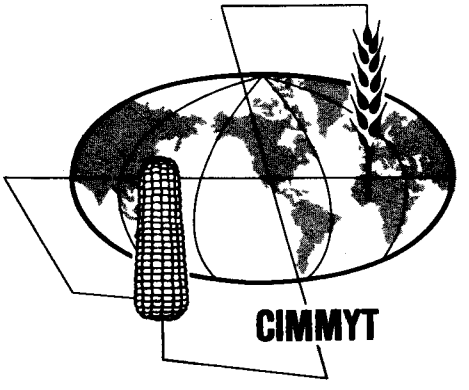
Instructions for the

Management and Reporting of Results for all International Screening Nurseries

Bread Wheat	(IBWSN)
Durum	(IDSN)
Triticale	(ITSN)
Septoria	(ISEPTON)



CENTRO INTERNACIONAL DE MEJORAMIENTO DE MAIZ Y TRIGO
INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTER
Apartado Postal 6-641 México 6, D. F., México

PLEASE RETURN THE RESULTS OF YOUR SCREENING NURSERY AS SOON AS POSSIBLE AFTER HARVEST

Late returns lead to serious delays and reduce their value to wheat workers throughout the world.

GENERAL COMMENTS ON ALL SCREENING NURSERIES

The objectives of these nurseries are to 1) provide the cooperating scientists an opportunity to assess the performance of new advanced lines originating from active wheat breeding projects, 2) supply cooperators and CIMMYT with valuable information on performance of new materials under a wide range of climatic and disease conditions and 3) release a source of new genetic variability which the cooperator may use directly or in crosses within his breeding program.

It is understood that anyone collaborating in these tests will be free to use any of the material included in any nursery. When directly released as a commercial variety, the country of origin should be recognized.

The results of the trials will be summarized and published for general distribution. It is important that cooperators study carefully the following pages which provide directions for the conduct of the nursery, note-taking techniques and the return of summarized data. The value of the nurseries will depend to a large degree on the quality of the returned reports.

We request the cooperation of all persons or institutions interested in these tests, which are a collective endeavor. Success depends upon maximum interest and cooperation.

INTERNATIONAL BREAD WHEAT SCREENING NURSERY

The International Bread Wheat Screening Nursery (IBWSN) is designed to rapidly assess a large number of advanced generation (F_3-F_7) lines of spring wheats under a wide range of latitudes, climates, day lengths, fertility conditions, water management and most specifically, disease conditions. The distribution of these nurseries is deliberately biased towards the major spring wheat regions of the world where the diseases of wheat are of high incidence. Each year one nursery is prepared and shipped to cooperators from Obregon, Sonora, Mexico. Shipments are usually made by mid-June.

INTERNATIONAL DURUM SCREENING NURSERY

The objectives of the IDSN are those of the IBWSN, that is, to rapidly evaluate a large number of advanced generation lines under a variety of disease and climatic conditions.

One nursery is prepared yearly from the Obregon, Sonora harvest and shipped to interested cooperators in the major Durum wheat areas of the world.

INTERNATIONAL TRITICALE SCREENING NURSERY

The ever increasing interest in the man-made crop, Triticale has prompted CIMMYT to offer a screening nursery for advanced generation materials. Initially, the International Triticale Yield Nursery was capable of evaluating new material. Recently, with more rapid advancement in several areas a screening nursery was established to evaluate advanced lines under an array of conditions. This information is vital to breeders now wishing to develop commercially acceptable Triticale varieties with broad adaptability and sound disease resistance.

INTERNATIONAL DISEASE NURSERIES FOR SEPTORIA, MILDEW AND ALTERNARIA, ETC.

Disease nurseries are designed to identify and evaluate potential sources of disease resistance with a minimum complication. Selection of participating locations is based primarily on the likely occurrence of a particular disease. Much lesser emphasis is placed on agronomic evaluations and performance.

PLANTING THE SCREENING NURSERY

A single packet of seed is provided of each breeding line to be tested, and every 20th packet contains seed of a control variety selected from the International Spring Wheat Yield Nursery.

There is sufficient seed in each packet to allow any one of the following unreplicated planting arrangements:

1. One 5 meter row
2. Tow $2\frac{1}{2}$ meter rows
3. One $2\frac{1}{2}$ meter row at each of 2 locations

It is important to sow in accurate rows as yield measurements might be taken (see "Type of data requested"). In any case indicate which planting arrangement was used when returning information.

The spacing between rows and the shape and dimensions of the field layout are left to the discretion of the cooperator.

PLANTING DATE

Because screening nurseries are prepared and airfreighted from Mexico only once a year, some cooperators may receive their set out of season. It is important that the seed be stored in a safe place until the normal growing season. The nursery should not be grown out of season unless there is a very good reason for doing so (e.g. disease development). If it is grown out of season, please indicate this on the data sheets to be returned.

FERTILIZER AND MANAGEMENT

It is strongly urged that the nursery receive adequate fertilizer and good management. In wheat as well as other crops, new advances in production are generally made by selecting lines that will respond to fertilizer and better management. These lines can only be selected under optimum conditions.

PROTECTION FROM BIRDS AND ANIMALS

Differential varietal damage by birds or animals will nullify the value of any experiment. Therefore, each cooperator is urged to make certain that his experiment is protected from such pests, with the methods employed left to the discretion of the collaborator.

DATA COLLECTION

The types of data collected will depend in part upon the nursery and the degree of differentiation among the entries. This decision is left to the discretion of the cooperator. For uniformity of reporting, the following types of data and units of reporting have been selected as convenient for cooperators and for purposes of summary reports.

1. Yield in Kg/Ha. (Although these nurseries consist of unreplicated rows, the range of genotypes and trial environments is so great that very valuable information can be obtained from comparative grain yield data.)

2. Days to flowering and/or maturity.

3. Stripe rust (Both leaf and head reaction, where possible, in the modified Cobb's Scale.) See later section - Disease Notes.

4. Leaf rust (Modified Cobb's Scale.)

5. Stem rust (Modified Cobb's Scale.)

6. Septoria and other leaf diseases (on 0-9 scale). See later section Disease Notes.

7. Any other disease factor for which differential data can be taken.

8. Height (cm)

9. Lodging (Percentage)

10. Shattering (Percentage)

11. Any other agronomic factor for which differential data can be taken, e.g. cold resistance, sterility, etc.

12. Quality data

IMPORTANT: All data will be expected in the above units of measure (i.e. yield in Kg/Ha). If other units of measure must be reported, please specify clearly.

RETURN OF DATA

One single form is provided in this manual (last page) for recording only the best varieties. The intent of this form is to 1) reduce the workload for cooperating scientists, 2) reduce mailing costs of bulky returns and 3) greatly speed up report analyses and publishing of reports. Carbon paper is between the first and second copy. This carbon copy is for your records.

METHODS OF REPORTING RESULTS

Section 1 - Location description.

We request only essential information on the location at which the experiment was conducted. Please fill in this section as completely as possible. Total amounts of fertilizer must be converted to actual amounts of elemental form in Kg/Ha (Note P and not P_2O_5, etc.) "Comments" may include extent of bird damage, frost injury, etc.

Section 2 - Selection of 25 best entries for 2 or more traits.

After completing all of the location description requested enter the 25 entries selected for 2 or more characters stating clearly in the above space which traits the entries were selected for. For example, one might select the best stem rust resistant varieties and of those the 25 best for leaf rust. Another cooperator might prefer to select the best Septoria resistant entries with good phenotype and high relative yield. Other data may be included if the cooperator so wishes.

A Check Variety, if selected within the 25 best, should be entered only once and thereby provide more spaces for selection of other worthy entries. If less than 25 entries are worthy of selection, list only those selected and so state. Do not report more than 25.

Section 3 - Selection of the 10 best entries for one trait.

Under some conditions a cooperator may wish to report only the 25 best entries for 2 or more traits (Section 2). Others may elect to report the best entries for only one trait (e.g. Septoria). This decision is left to the discretion of the cooperator. He may elect to do both.

Three boxes were provided for reporting results. One, two or three may be used by the cooperator, depending upon the number of traits he wishes to report in this manner.

After entering the variable name in the column heading, the entry number and abbreviated entry name, the corresponding data should be entered. Data reported for one trait are completely independent of any other trait reported and the identifying information must be entered for each box. A check variety if selected as one of the 10 entries, should only be listed once. If less than 10 entries are worthy of selection for one trait, list only those selected and so state.

Section 4 - Date notes taken

Please indicate the dates that notes were recorded in the space provided.

BACK OF FORM

Section 5 - Check variety entries 50, 51, 52, 53, 54

For each nursery 5 check varieties will be included to indicate to us the levels of disease at the test location. Cooperators should provide the disease data on these entries (even if selected and presented on reverse side) for any disease reported.

Section 6 - Observations

This space is provided for any additional comments the cooperator may wish to make.

DISCUSSION

We at CIMMYT are hopeful that this form will facilitate the return of data so vital to many breeding programs around the world.

All of us admit that not all of any nursery is outstanding. The intention of international testing is to discover what material is outstanding. We hope that this new method of reporting results will let all contributors benefit from each others data.

The data book is provided for their personal use and as a source of information for the summarized report. The field book is not to be returned to CIMMYT. Only the original copy of the summary report is to be completed and returned.

Cooperators may choose to record data for only the best entries, discarding freely throughout the season as it becomes apparent that some entries are unworthy of consideration. In this way, variables such as yield are no longer difficult since only a few entries need be harvested.

RETURN OF DATA

The completed summary form should be Air Mailed to:

International Wheat Nurseries
Centro Internacional de Mejoramiento de
Maiz y Trigo
Apartado Postal 6-641
Mexico 6, D. F., Mexico

as soon as possible after harvest. If planting plan 3 is adopted ($2\frac{1}{2}$ meter row at 2 locations), please provide data from both locations.

One important requirement is that the data be returned as quickly as possible so that it can be compiled into preliminary reports and made available to the other cooperators.

When all cooperators have reported, a final summary will be published for general distribution.

SUBMITTING LINES FOR TESTING

Cooperators are invited to send approximately 300 grams of advanced generation lines for increase and inclusion into a screening nursery. The package must be labeled:

"Experimental Wheat Seed - No Commercial Value"

and reference should be made to the nursery for which the submission is intended. Seed should be sent to the above address.

DISEASE NOTES

(Please Read Carefully)

Cereal Rusts

The method outlined below for taking notes on stem, leaf and crown rust infection was recommended by Dr. W.Q. Loegering, (USDA International Spring Wheat Rust Nursery 1959) for use with the International Rust Nursery. This recommendation has been adopted for the sake of uniformity in compiled data.

Field notes on the rusts of cereals describe severity (percentage of rust infection on the plants) and response (kind of infection).

Severity

Severity is recorded as percent of infection according to the modified Cobb's scale. As severity is determined by observation, readings cannot be absolutely accurate. Therefore, below 5 percent severity, the intervals used are trace (t) to 2. Usually, 5 percent intervals are used from 5 to 20 percent severity and 10 percent intervals for higher readings.

The diagram shows six degrees of rustiness, which may be used in estimating the percentage of rust infection on leaf or stem. The shaded spots represent rust, and the figures represent approximately the rust percentage computed on the basis of the maximum amount of surface covered by rust as shown in the 100 percent figure. This figure represents 37 percent of actual surface and is arbitrarily selected as 100 percent infection.

Response

The response of a variety refers to the type of infection and is recorded by the following capital letters:

0 - no visible infection of plants.

R - resistant. Necrotic areas with or without minute uredia present.

MR - moderately resistant. Small uredia present surrounded by necrotic areas.

MS - moderately susceptible. Medium sized uredia with no necrosis, possibly some distinct chlorosis.

S - susceptible. Large uredia with no necrosis and little or no chlorosis present.

X - intermediate. Variable sized uredia, some with necrosis and/or chlorosis.
(Under special circumstances it may be desirable to use VR- very resistant or VS - very susceptible. Usually, distinctions between VR and R, or VS and S are difficult to make and therefore are of little value.)

Combining Severity and Response Readings

Readings of severity and response are recorded together with severity first. For example:

tR - trace severity of a resistant type infection.

5MR - 5 percent severity of a moderately resistant type infection.

60S - 60 percent severity of a susceptible type infection.

Variability in Reaction

Usually, a single severity and response gives an adequate picture of the reaction of a line or variety; occasionally there is obvious variability in reaction within a line. This variability may appear in several forms:

1) Clear-cut separation of plants into 2 or even 3 classes.

2) A range of reaction from plants without clear-cut separation into classes.

3) A range of reaction on each plant.

1) and 2) may result from either segregation or seed mixture, while 3) may result from either race mixtures in the field or an X-response of the variety.

It is usually impractical to try to determine what causes the variability. However, it is quite simple to record whether the variability is represented by a clear-cut separation of plants into classes or by a range in the reaction as follows:

" , " Segregation or seed mixture. A comma separating two severity and response readings indicates that the plants fall into clear-cut classes with readings as given. For example, 5R, 40S, means that there were two classes of plants in the row with respect to reaction to rust; one group 5R and the other 40S.

" - " Range in reaction. A dash separating two readings indicates a range in severity and response of the plants in the row. For example, 15R-5S means that there was range of severity and response to rust from 15R to 5S.

When using these combinations the first reading is understood to represent the predominating class.

Readings Difficult to Make

E - escape. Often a variety or line will have little or no rust, but there is doubt that it is truly resistant because it matured early or for other reasons. Thus "0E" indicates that there was no rust on the variety, but there is doubt that the variety was as resistant as "0" would indicate.

N - Very often one disease such as stripe rust or a leaf spot is so severe that the taking of notes on certain other diseases is impossible. When this is the case, the letter "N" should be used to indicate that this was the case. For example, if stripe rust kills the leaves before leaf rust can develop, then the note for leaf rust will be "N".

"-" - When data cannot be recorded on an entry for any other reason, the space for the note should be marked with a dash (-).

Foliar Diseases (other than the rusts)

Data scales for Septoria, helminthosporium, powdery mildew and other leaf spot diseases have never before been internationally standardized as have been the rust scales. Drs. Eugene Saari (Ford Foundation) and J. M. Prescott (Rockefeller Foundation) of the Indian Project have recently developed an easy, simple and reliable method of evaluating foliar reactions. The basic focus of the scale is the mid-point of the plant.

To apply the scale grasp the plant half-way up. Lesions up to this point, but not above indicate an intensity of 5. Disease distributed above this point is given values from 6 to 9 (most intense). Disease distributed below this point is given a value from 1 to 4. A value of 0 (zero) is reserved for no infection. A precise description of this scale is given in Table 1 and Figure 1.

In cases where it is desirable to record the degree of infection in the ear a slash mark can be drawn and the percentage ear infection given (e.g. 6/50 would mean a leaf infection just above the mid point with 50% of the ear infected.

OTHER DISEASES

Infections of the head, spike, root and crown diseases and insect damage should be recorded in percentage infection or damage.

TABLE 1. FOLIAR DISEASE SCORING SCALE (0-9) FOR WHEAT

0 = Free from infection.

0E = Free from infection, but probably represents an escape.

1 = Resistant: Few isolated lesions on lowest most leaves only.

2 = Resistant: Scattered lesions on the second set of leaves with first leaves infected at light intensity.

3 = Resistant: Light infection of lower third of plant, lowest most leaves infect at moderate to severe levels.

4 = Moderately Resistant: Moderate infection of lower leaves with scattered to light infection extending to the leaf immediately below the mid-point of the plant.

5 = Moderately Susceptible: Severe infection of lower leaves. Moderate to light infections extending to the mid-point of the plant with upper leaves free. Infections do not extend beyond mid-point of plant.

6 = Moderately Susceptible: Severe infection of lower third of plant, moderate degree on middle leaves and scattered lesions beyond the mid-point of the plant.

7 = Susceptible: Lesions severe on lower and middle leaves with infections extending to the leaf below the flag leaf, or with trace infections on the flag leaf.

8 = Susceptible: lesions severe on lower and middle leaves. Moderate to severe infection of upper third of plant. Flag leaf infected in amounts more than a trace.

9 = Highly Susceptible: Severe infection on all leaves and the spike infected to some degree. Spike infections are scored as a modified scale of the percentage of the total area covered. The percentage figure follows the numerical leaf infection score and it is separated by a /.

N = Used to indicate no scoring possible due to necrosis as a result of other diseases or factors.

SCALE FOR APPRAISING FOLIAR INTENSITY OF WHEAT DISEASES 0 - 9