

THE 1ST MULTI-ENVIRONMENT TESTING FOR RAINFED LOWLAND RICE - STAGE 2 WET SEASON (MET2-RL, 2014WS)

Introduction

IRRI breeding program generate fixed and stable lines each season that are identified from pedigree nurseries as well as observational and replicated yield trials. Eventually, elite lines are advanced to multi-environment testing (MET) conducted via breeding networks. These networks however, presently have limited geographical coverage and face challenges in terms of germplasm movement. Moreover, the materials tested through these networks are generally in the advanced stage of varietal development. An exhaustive MET system for early generation testing of breeding products for the irrigated lowland has been established at IRRI in 2011 and will now expand to the rainfed lowland agro-ecology.

Goal

- To establish a systematic, sequential, multistage, and multi-environment testing (MET) system for elite breeding lines, managed through one entity, in order to improve overall breeding efficiency.

Objectives

- To identify elite breeding lines with high and stable yields and wide adaptation across a target population of environments that can be the future mega-varieties;
- To be able to select superior breeding materials adapted to one or more specific environment(s) and agro-ecologies;
- To develop and deploy varieties and breeding products to specific market segments;
- To exploit genotype, environment, and genotype x environment (G X E) interaction contributions to varietal performance in releasing breeding products to one or more target environments;
- To generate earlier feedback to breeders on trait performance and identify trait packages needed for molecular breeding;
- To improve partnerships with public, NGO, and private sectors who may have roles to play at certain testing/variety development stages.

Trial Composition

The MET2-RL trial is the second stage of testing breeding lines. Since this will be the pilot stage for the rainfed lowland agro-ecology, the lines will have to be composed of fixed and stable lines from IRRI and collaborating NARES institutions that have undergone advanced testing. The designation, source and other information of each entry are provided in Table 1.

The check varieties and their corresponding entry number are as follows:

Designation	MET No.	Entry No.	
		Plot	Border Plots
IRRI 148	MT1031	31	801
IRRI 161	MT1032	32	802
IRRI 164	MT1033	33	803
Local Check	MT1044*	44	804

**may vary in other Southeast Asian countries*

The Experimental Site, Design and Layout

An experimental field uniform in soil texture, depth, and fertility should be chosen for the MET2-RL trial. It should not have been used previously for fertilizer experiments. The area covers 1512 m² of land per site. It is suggested that the same area be utilized for the MET every season.

The trial will be conducted using a row-column design with two replications. This design is used to consider possible field variation. Each replicate will have 26 rows and 2 columns. All test entries are randomly assigned with plot numbers and each replicate have different randomization. All checks are randomly assigned in a replicate and are also included within each column as border plots. The plot randomization of entries is given in Tables 1 and 2. The seed packets are arranged and numbered according to plot numbers.

Prepare the field thoroughly before planting by following the locally recommended standards. Follow the field plan showing the locations of the plots. Alleys between blocks should be at least 1 meter. The experimental field should be properly labelled. The plot size for each entry is 10 m² = 2.0 m x 5.0 m. (10 rows with 20 cm distance between rows).

There should be no vacant rows between plots (entries). Place the stakes bearing the plot labels at the first left-most row of each plot from left to right in all replications. This should be done before distributing the seed packets for planting. Check the entries and plots before sowing the seeds. Distribute the seeds evenly on each of the 10 rows of each plot. Each packet will have 200 grams of seeds per plot (20 g per row or 4 g per meter).

Cultural Management Practices

Follow the locally recommended cultural management practices in the area. Do not replant missing segments or thin out plants.

For fertilizer requirements, rate of application will be soil analysis. However, in the absence of such, the locally recommended rate should be followed. A rate of 90-30-30 kg/ha (N₂, P₅O, K₂O) may be applied depending upon local situations. Apply 30 kg N and all P and K at planting and before covering the seeds in furrows. Apply another 30 kg N at mid-tillering stage. The remaining 30 kg N should be applied a week before panicle initiation.

For weed control, a pre-emergent herbicide may be applied uniformly at recommended rate in well saturated soil within three to five days after sowing. Weeding may start 10 days after seedling emergence. The second manual weeding may be done 30 days after seedling emergence. Spot weeding after the last hand weeding should be done as often as necessary.

For disease and pest control, the experimental area should be well protected. Choose the appropriate cultural, chemical and biological control to effectively manage pests and diseases. If available, carbofuran may be applied at around 15 DAS and at PI. Prophylactic application of Benlate at PI and follow-up spray at 2 weeks later may also be done to control sheath blight.

For rodent control, maintain the general cleanliness of the surroundings especially the levees. Practice sustained baiting immediately after sowing using chronic rodenticide. Place poisoned baits in suitable containers to prevent the bait from getting wet and from being taken by domestic animals. The baits

should be placed in at least five strategic locations. Check baiting stations regularly to replace consumed and moldy baits.

Data Collection

The general reference for data collection is the Standard Evaluation System for Rice (SES, 2013). The following agronomic data are collected:

VG	<p>Vegetative vigor. Note: Several factors may interact, influencing vigor (e.g. tillering ability, plant height, etc.) Use this scale for evaluating genetic material and varieties under stress and non-stress conditions. To be taken at tillering stage (at 30 DAS).</p> <p>1 - Extra vigorous (very fast growing; plants at 5-leaf stage have 2 or more tillers in majority of population) 3 - Vigorous (fast growing; plants at 4-5 leaf stage have 1-2 tillers in majority of population) 5 - Normal (plants at 4-leaf stage) 7 - Weak (plants somewhat stunted; 3-4 leaves; thin population; no tiller formation) 9 - Very weak (stunted growth; yellowing of leaves)</p>
FLW	<p>Days to 50% flowering. Number of days from sowing to 50% flowering. The rice plants in a plot is considered flowering when 50% of the tillers have emerged panicles.</p>
MAT	<p>Days to maturity. Number of days from sowing to grain ripening (85% of grains on panicles are mature).</p>
HT (cm)	<p>Plant height. Average of five samples measured in centimeters from soil surface to the tip of the tallest panicle (awns excluded).</p>
TILLER	<p>Number of productive tillers. Count the number of tillers bearing panicles on two 1-meter sampling area from the different middle rows of the plot. Average of two samples.</p>
LDG	<p>Lodging incidence. Percent of plants that lodge with at least 45° angle.</p>
YLD	<p>Plot yield (g)- excluding borders Adjusted yield = (plot yield/harvested plot area)*MF. Where MF= (100-MC at harvest)/86. Exclude border rows and 30cm end segments.</p>
MC	<p>Moisture content of grains in percent (%). To be measured simultaneously when weighing the plot yield.</p>

Phenotypic
Acceptability

PACP

PACP	Trait	Description
Plant	Plant type	Stiff straw, erect upper and semi-droopy lower leaves, no unproductive tillers, early vegetative vigor, fast recovery after stress (drought, etc)
	Tillering	High productive tillers (>600 panicles/m ²)
	Plant height	Intermediate height (110-130 cm)
Panicles	Length	Medium to long, good exertion
	Density	Large panicles with high percentage filled grains, compact, non-shattering
	Fertility	High (>95%)
Grains	Hull	Clean, thin hull, no discoloration
	Shape	Not deformed, heavy, medium slender
	Others	No awns

Grain quality characteristics will be measured on selected entries only at IRRI:

AMY: Amylose content of grain in percent.

GELTEMP: Gelatinization temperature.

GELCON: Gelatinization Consistency after milling.

Scale	(mm)	Gel consistency type
1	81-100	Soft
3	61-80	Soft
5	41-60	Medium
7	36-40	Hard
9	<35	Hard

GRL: Grain length in mm. Distance from the base of the lowermost sterile lemma to the tip (apiculus) of the fertile lemma or palea. The grain is measured to a point comparable to the tip of the apiculus in awned varieties.

GRS: Grain shape after harvesting, cleaning and dehulling.

Scale	Shape	Ratio
1	Slender	Over 3.0
3	Medium	2.1 - 3.0
5	Bold	1.1 - 2.0
9	Round	<1.1

CHK: Chalkiness of endosperm. Percent in Kernel Area. Evaluate a representative milled sample for the degree (extent) of chalkiness that will best describe the sample with respect to: a. white belly; b. white center; and c. white back.

Scale

0	None
1	Small (<10%)
5	Medium (11% - 20%)
9	Large (>20%)

Data Reporting

All the data is sent to the MET Data Manager - electronic copy (sent as email attachment) or hard copy via courier.

An excel file for data recording corresponds to a trial-year-set number combination. A set number refers to a specific testing site. Examples of excel files are:

- a. MET2-RL 2014/Set No. 51- _____ (PHILRICE Muñoz, Philippines)

The data sheet names and data to be entered in each sheet are summarized below:

Excel file sheet name	Data to be entered
LOCATION AND EXPT-DESC (experiment description)	Test site data, names of cooperators and data about agronomic practices
WEATHER-OBS (weather-observation)	Monthly weather data
PEST-OBS (pest observation)	Pest type, pest name and degree of pressure
EXPT-OBS (experiment observation)	Entry data (plant height, days to flowering, etc.)

Please fill-out the excel data sheet and send to IRRI as an email attachment to: a.tabanao@irri.org and a.galang@irri.org.

There is also a weekly status report that will need filling out once a week (preferably on a Friday) at this web link: <http://form.jotform.me/form/30207518205444> or here: <https://sites.google.com/a/irri.org/inger/met/submit-weekly-met-report>.

The data can also be uploaded at the MET website by clicking the "Upload Data" icon on this web link: <https://sites.google.com/a/irri.org/inger/met>.

You may send printed data sheets of this field book to:

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