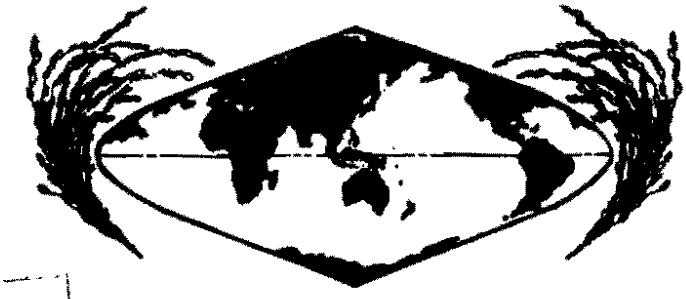
Series 03ER-3

International Rice Testing



Program for Latin America

Report of the Third Conference

May 30 - June 2, 1979

COOPERATION

Third Conference of the International Rice Testing Program for Latin America

Sitting: M.J. Rosero (IRRI/CIAT), A. Jiménez (Peru), W. Peñafiel (Ecuador), Y.T. Hsieh (Dominican Republic), F. Andrade (Ecuador), W.R. Pazos (Guatemala), S.A.M. do Cruz (Brazil), E. Espinosa (Panama), J.H. Morales (Colombia), J.R. Alvarado (Chile), M.E. Castillo (Dominican Republic), R. Lasso (Panama).

Row 1: J.I. Murillo (Costa Rica), A. Grobman (CIAT), S.W. Ahn (CIAT), B. Rivera (Colombia), V. Saavedra (Peru), F. Paz A. (Bolivia), G. Veitía (Cuba), A. Gutiérrez (Cuba), J. Almeida Diniz (Brazil), J. Hernández (Peru), V. de Giovanni (Colombia), B. Rodríguez (Dominican Republic), B.A.C. Enyi (WARDA), S.B. da Rocha (Brazil), R. Olaya (Peru).

Row 2: D. Leal (Colombia), E. García (Colombia), R. González (Costa Rica), A. Salih (Venezuela), C. Grand-Pierre (Haiti), D. Farias Novaes (Brazil), A.V.E. Chin (Guyana), P. Lee (Belize), L. Small (Guyana), M. J. Idoe (Surinam), D.M. de Souza (Brazil), C. Tacury (Ecuador), C. Alburez (Guatemala), A. Dávalos (Colombia), R. Robayo (Colombia), M.H. Carrera (Costa Rica).

Row 3 : J. Delgado (Ecuador), G. Benavides (CIAT), J.E. Rodas (Paraguay), C. Reyes (Panama), C. Jaramillo (CIAT), A. Rodríguez (Venezuela), A. Bonifacio (Brazil), V.M. Oliveira Lima (Brazil), K. Cardwell (Colombia), J.E. Muñoz (CIAT), L. Johnson (Ecuador), P. Vargas (Colombia), P. Jennings (Costa Rica-CIAT), N.N., L. López (Venezuela), C. de López (Venezuela).

Row 4: C.P. Martínez (Colombia), J.M. Cordero (ELANCO), G. Villegas (Colombia), H.E. Kauffman (IRRI), J. González (CIAT), N. Van Tan (Brazil).

INTERNATIONAL RICE TESTING PROGRAM

FOR LATIN AMERICA

Third Conference of the IRTP and the Problem of Rice Blast in Latin America

PROGRAM

Place: CIAT
Date: May 30-June 2, 1979

May 30 (Wednesday)

08:00 - 09:00	Registration
09:00 - 09:15	Welcome - Dr. J.L. Nickel
	Chairman: Dr. A. Grobman
09:15 - 09:30	Objectives of the Third Conference of IRTP for Latin America - M.J. Rosero
09:30 - 10:00	Processing and analysis of data on the IRTP nurseries for Latin America - J.E. Muñoz
10:00 - 10:10	Discussion
10:10 - 10:40	Coffee break
10:40 - 11:30	Results of nurseries distributed in 1977 - M.J. Rosero
11:30 - 11:45	Discussion
11:45 - 12:15	New IRTP focuses and germplasm collection - H.E. Kauffman
12:15 - 12:30	Discussion
12:30 - 14:00	Lunch
14:00 - 17:00	Future plans for the IRTP nurseries for Latin America
	Discussion leaders: - H.E. Kauffman and - M.J. Rosero
	- Organization of IRTP in Latin America
	- Nurseries
	- Monitoring tours
	- Planning and revision sessions

Coffee break

Methodology and management of nurseries
- Nomination of selections
- Seed multiplication and delivery of nurseries
- Collecting data
- Sending of reports
- Processing, analysis and evaluation of germplasm in the different nurseries

May 31 (Thursday)

08:30 - 15:40	Presentation of reports from the countries participating, 10 minutes each.
	Discussion leader: - P.R. Jennings
08:30 - 10:00	Bolivia, Belize, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador.
10:00 - 10:30	Discussion
10:30 - 11:00	Coffee break
11:00 - 12:00	Guatemala, Guyana, Haiti, Honduras, Nicaragua.
12:00 - 12:30	Discussion
12:30 - 14:00	Lunch
	Discussion leader: - M.J. Rosero
14:00 - 15:10	Panama, Paraguay, Peru, Dominican Republic, Surinam, Uruguay, Venezuela.
15:10 - 15:40	Discussion
15:40 - 16:10	Coffee break
16:10 - 16:40	Current status and future plans of CIAT's Rice Program - J.A. González
16:40 - 17:00	Discussion

June 1 (Friday) Discussion leader: P.R. Jennings

08:00 - 11:15	Report on recent progress and research plans on rice blast and breeding for resistance.
08:00 - 08:30	IRRI - J.P. Crill
08:30 - 09:00	IITA - I. Buddenhagen
09:00 - 09:30	EMBRAPA - N. Van Tan
09:30 - 10:00	Pennsylvania State - D.R. MacKenzie
10:00 - 10:30	Coffee break
10:30 - 11:15	CIAT-ICA - C.P. Martínez and S.W. Ahn
	Discussion leader: - H. Weeraratne

11:15 - 12:45	Discussion on identification and development of breeding methods for resistance to rice blast.
12:45 - 14:00	Lunch
14:00 - 17:00	Discussion leader: - M.J. Rosero
	Future cooperative research on rice blast in Latin America.
June 2 (Saturday)	Visit to CIAT and ICA experimental fields.
08:30 - 09:30	Rice blast infection beds and selection for resistance to the rice plant hopper, in ICA. - C.P. Martínez, H. Weeraratne and Research Assistants
09:30 - 10:45	IRTP nurseries for Latin America at CIAT. - M.J. Rosero and Research Assistants
10:45 - 11:25	Breeding plots at CIAT - H. Weeraratne and Research Assistants
11:25 - 12:00	Rice agronomy plots at CIAT - J.A. González and Research Assistants

CONTENTS

REPORT OF THE THIRD CONFERENCE OF THE IRTP

FOR LATIN AMERICA

Manuel J. Rosero*

INTRODUCTION

The International Rice Testing Program (IRTP) for Latin America is sponsored by the Centro Internacional de Agricultura Tropical (CIAT) and the International Rice Research Institute (IRRI), with funds from the United Nations Development Programme (UNDP). The testing program was formalized in 1976 with the object of evaluating at CIAT, nurseries introduced from IRRI and the promising material developed by national programs in Latin America. From among this germplasm, the material considered most appropriate to the needs of the various Latin American countries is distributed through various specific nurseries.

Three conferences of this nature have been held at CIAT: the first in August 1976, had the participation of 35 delegates, including national program leaders from 14 countries. Discussed in this conference were the bases for establishing an international cooperative rice testing program in Latin America; the coordination channels were also established and the type of nurseries, operational procedures for managing them and data reports were defined. The second conference was held in November 1977, with the participation of 42 delegates, including national program leaders from 18 countries. IRTP activities for Latin America during 1976-77 were discussed in this conference and the results of the First International Rice Yield Nursery (VIRAL-76) were presented. Also discussed were the deficiencies in operational procedures. The needs for other nurseries specific to the region were defined and a schedule of activities for delivering nurseries from CIAT to national programs in the region was established. It was agreed that the IRTP conferences for Latin America would be held every two years to permit the presentation of results from all the nurseries dispatched annually to the different countries in the region, since the majority of them have different planting periods.

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* Ph.D. IRRI Liaison Scientist for Latin America.

OBJECTIVES OF THE THIRD CONFERENCE

The third conference of the International Rice Testing Program for Latin America had the following objectives:

- Present and discuss the final results of the nurseries distributed in 1977 and the preliminary results of some of the nurseries distributed in 1978.

- Discuss and correct the deficiences in the operating procedures related to management of nurseries in the field or with the data analysis and presentation of results.

- Determine the needs for new specific nurseries or those of general interest for the region.

- Generate, among cooperators from national programs, the idea that the IRTP is a means of technology transfer, which enables national programs to receive improved germplasm to be evaluated and released directly or indirectly, to the users.

- Update the data on area, production, yield, varieties and problems related to rice production in Latin America, based on reports presented by the national program leaders.

- Discuss recent progress and future plans for research in breeding varieties resistant to rice blast, the most limiting disease of the rice crop in Latin America.

- Give IRTP cooperators the opportunity to exchange ideas on the problems faced by rice producers.

THIRD CONFERENCE PROGRAM

Processing and Analysis of Data from the IRTP Nurseries for Latin America

María Cristina Amézquita, Research Associate in CIAT's Data Services Unit, prepared a summary of the processing and statistical analysis of the results of the IRTP nurseries distributed in 1977. This presentation was in charge

of Jaime Eduardo Muñoz, Research Assistant in the same Unit. The methodology employed in the individual analyses by locations and the combined analyses of all locations was presented. The individual analysis by location was done in order to establish comparisons among varieties and to select the best at the location, by means of the descriptive statistics calculations, analysis of variance (F test) and comparison of means (LSD) for yield, maturity and plant height.

The combined analysis identified those varieties adapted to a wide range of environments, by determining the environmental index for each locality, the adaptability index of each variety, the standard b error and the correlation coefficient between varietal yield and environmental index.

Based on yield data from the 1977 VIRAL-S germplasm, planted in nine sites, several examples were presented to explain the adaptability index interpretation, in the following way:

a) Variety with wide adaptability, when the adaptability index is equal to 1 (Line IR 2061-522-6-9, b = 0.99). This indicates that the variety's yield increase is equal to the increase from one location to another and that its yield is consistent in various environments (Figure 1).

b) Variety adaptable to good environments, when the adaptability index is greater than 1 (CICA 9, b = 1.42). This indicates that the yield increase of the variety CICA 9 is superior to the increase from one location to another and that it yields better in good environment (Figure 2).

c) Variety adaptable to poor environments, when the adaptability index is less than 1 (Kn361-1-8-6, b = 0.74). This indicates that its yield increase is less than the increase from one location to another and that it yields relatively better in poor environments (in this case it refers to localities with drought problems) (Figure 3).

Results of IRTP Nurseries for Latin America

Dr. Manuel J. Rosero, Coordinator of the IRTP for Latin America, presented the final and preliminary results of the nurseries distributed in 1977 and 1978, respectively.

The type of nurseries, number of selections from each nursery and number of sets delivered in 1977 and 1978 at the request of national programs were described (Table 1).

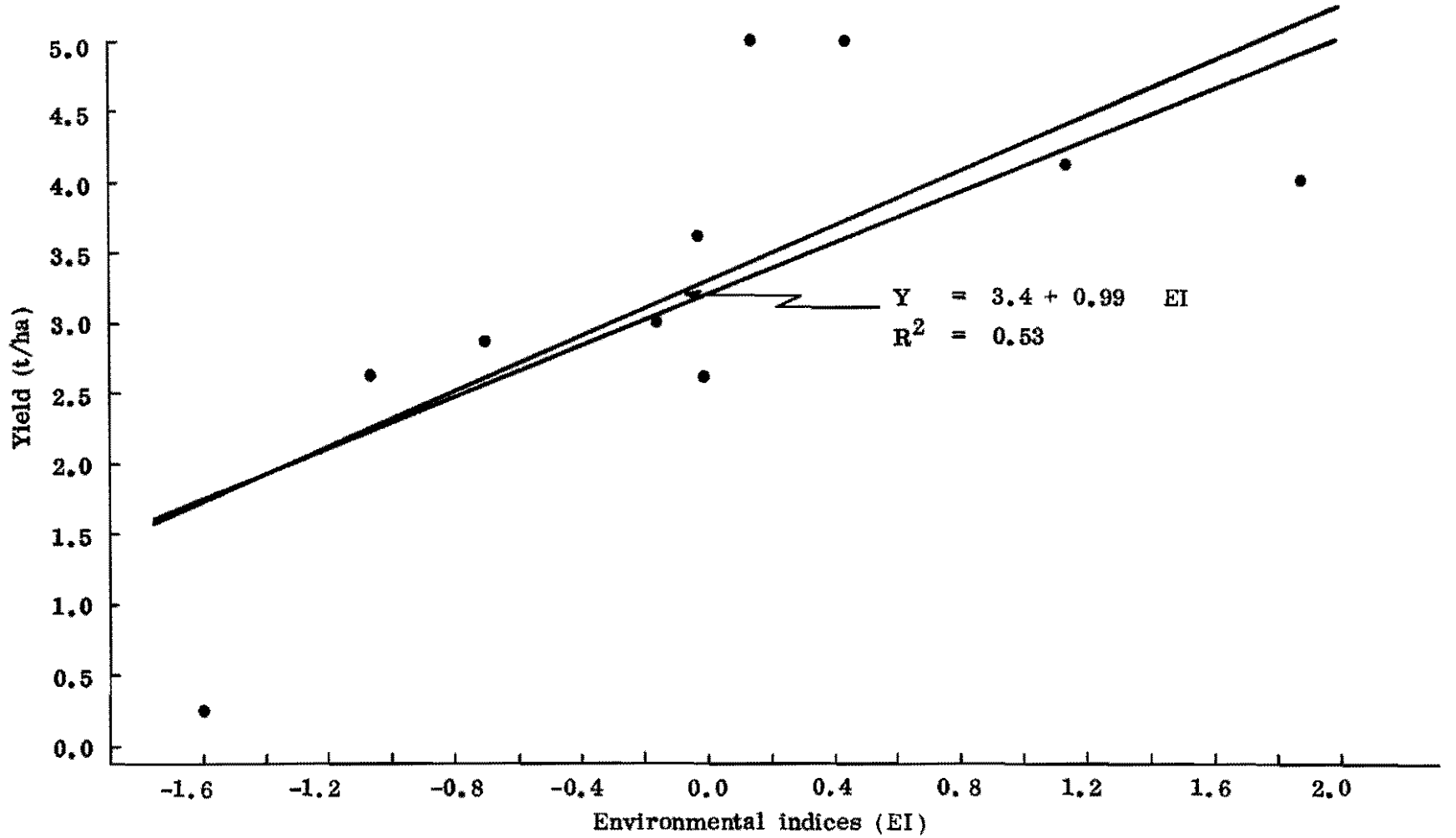

Figure 1. Adaptability range of the line IR 2061-552-6-9 from the 1977 VIRAL-S based on data from nine locations.

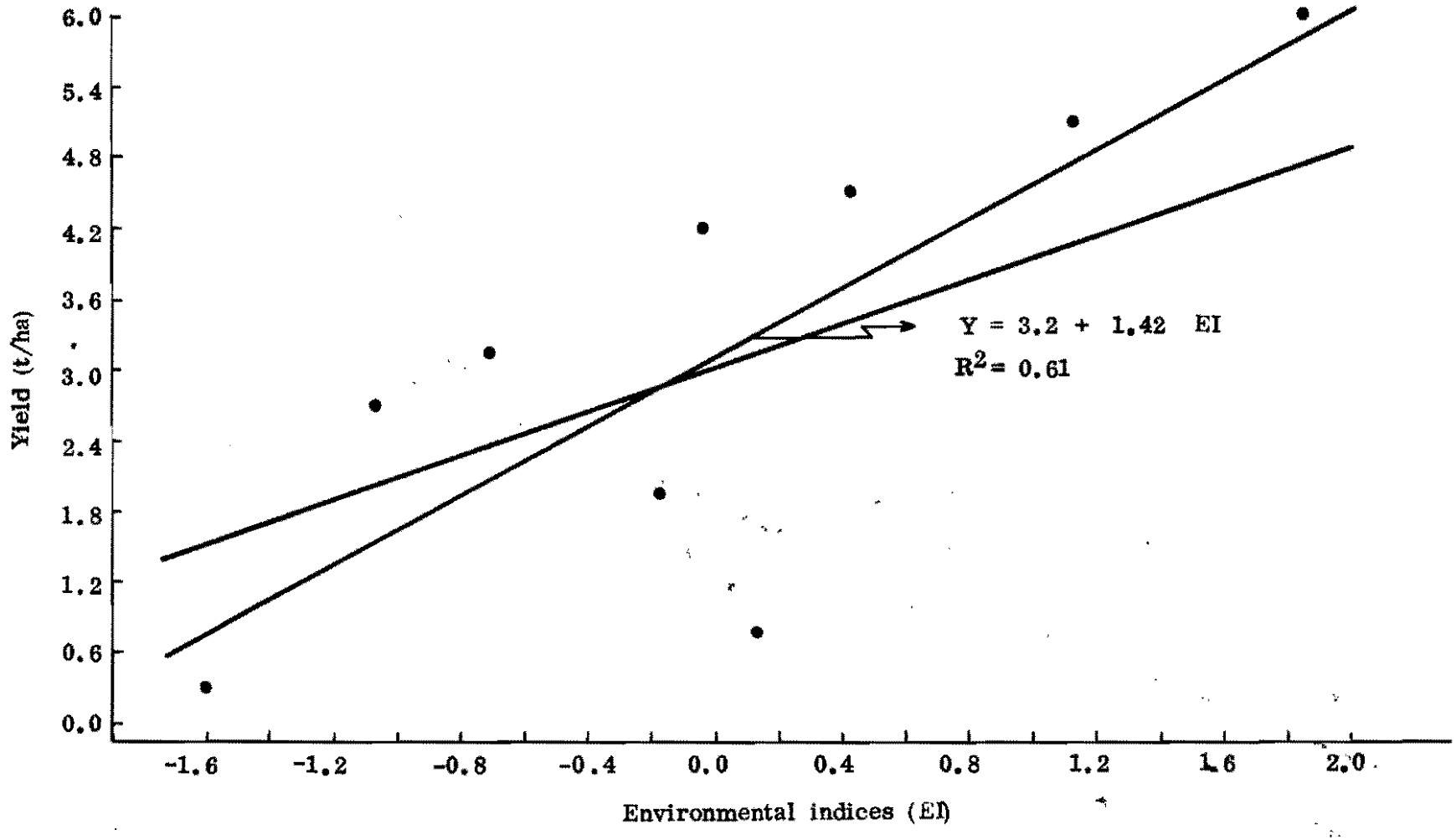

Figure 2. Adaptability range of the variety CICA 9 from the 1977 VIRAL-S based on data from nine locations.

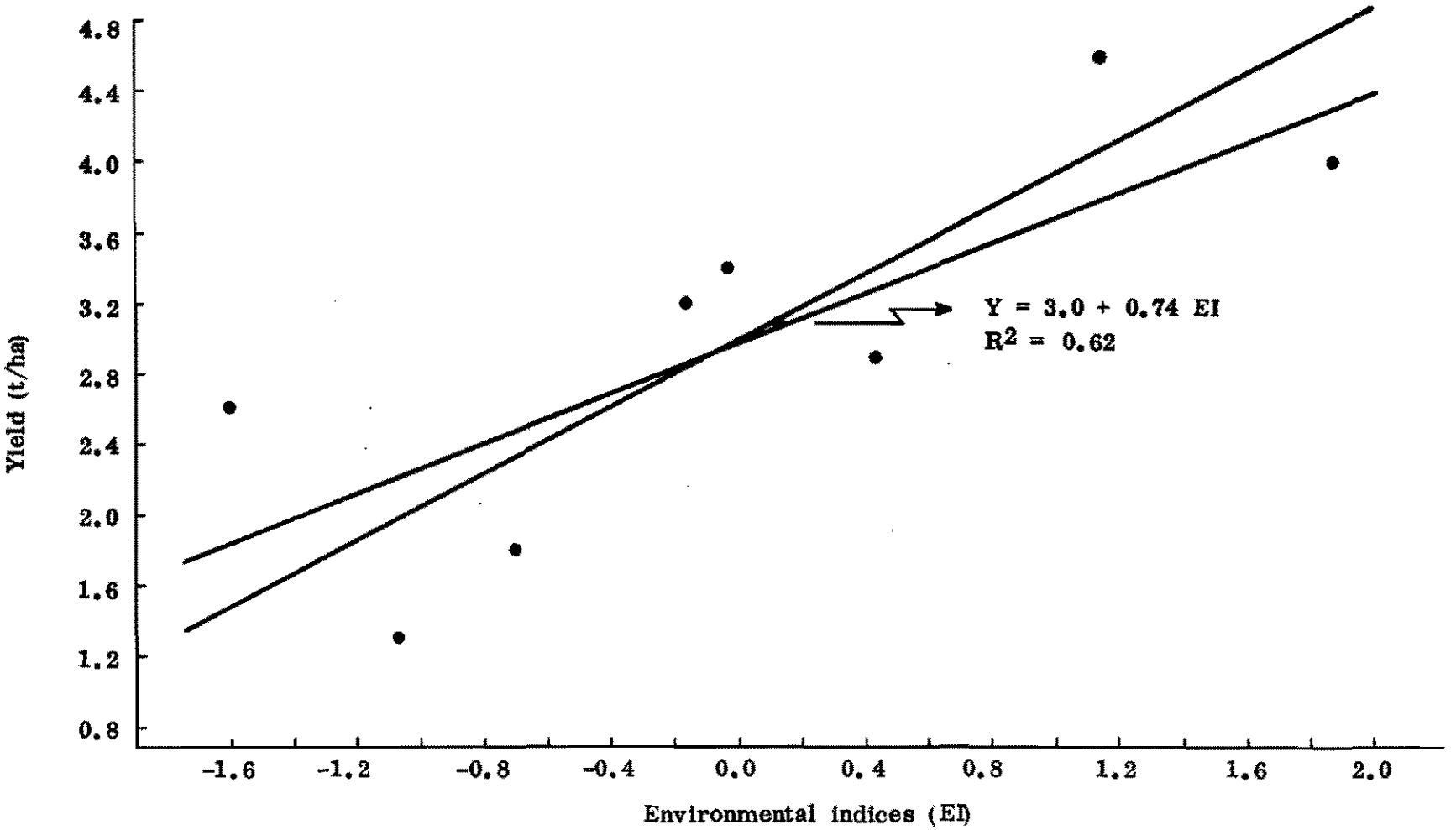

Figure 3. Adaptability range of the line Kn-361-1-8-6 from the 1977 Viral-S, based on data from nine locations.

The germplasm included in these nurseries was selected at CIAT from the 1976 and 1977 nurseries coming from IRRI. Germplasm selection was done: under field conditions, according to plant type, length of growing duration, resistance to lodging, and yield; and under laboratory conditions, depending on resistance to rice plant hopper (Sogatodes oryzicola) and grain type and quality. The lines which combined good plant type (semi-dwarf and intermediate in height, resistant to lodging), resistance to the rice plant hopper, early and medium maturity, long and medium grain with high milling and cooking quality, and high yield, were selected.

Table 1. IRTP Nurseries for Latin America distributed in 1977 and 1978.

Nursery 1/	Number of selections		Number of sets	
	1977	1978	1977	1978
VIRAL-P	10	-	28	-
VIRAL-T	15	14	28	26
VIRAL-S	14	19	22	31
VIRAL-F	8	8	5	5
VIOAL	-	60	-	37
VIPAL	-	185	-	31
VIAVAL	21	20	9	11
VIOSAL	37	25	4	7
TOTAL	105	331	96	148

1/ VIRAL = International Rice Yield Nursery for Latin America
-P = Early-maturing varieties
-T = Medium-maturing varieties
-S = Upland varieties
-F = Deep water varieties

VIOAL = International Observational Nursery for Latin America

VIPAL = International Rice Blast Nursery for Latin America

VIAVAL = International Sheath Blight Nursery for Latin America

VIOSAL = International Rice Salinity and Alkalinity Observational Nursery for Latin America.

The nurseries were distributed in March to those countries having planting periods in May and June, and in August, to those countries with planting dates in October and November (Figure 4).

Table 2 shows the number of nurseries delivered in 1977 and the data sets received for processing and analysis. The return of these data was satisfactory but it is expected that this cooperation will improve as the national programs become more aware of the benefits to be gained from the IRTP.

The participants received the final edited reports for the 1977 nurseries and the preliminary summary of various 1978 nurseries (Figure 5).

The most important factors from the VIRAL-P, VIRAL-T and VIRAL-S nurseries were presented, indicating yields and growth duration of the five most outstanding lines in each nursery (Tables 3, 4 and 5).

In relation to the sheath blight nursery (VIAVAL) for 1977 planted in nine localities (three under irrigation and six upland sites with good rainfall distribution), the incidence of the disease was registered in CIAT (Colombia), Guaymas (Honduras), Cañas (Costa Rica), and Tocumen (Panama). The incidence of sheath blight in Tocumen was severe and caused considerable yield reductions in susceptible lines. At this location the production of the susceptible control (IR1487-194) was null. However, highly resistant lines were observed (Table 6). In other localities the incidence of the disease was moderate.

Based on the final results of the four 1977 nurseries reported in the Third Conference of the IRTP for Latin America, it was determined that among the germplasm distributed there were several selections with good adaptation and high yield potential under irrigated and upland (with good rainfall distribution) systems.

With the objective of having an idea of the IRTP benefits for Latin America, national program leaders were asked to provide information on the utilization of germplasm distributed in the 1977 nurseries. The information received is summarized in Table 7. These lines have been selected for further testing in yield and/or regional trials. It was reported that selection No. 3 (designated IR1529-430-3) from the VIRAL-S was named commercially as IR1529 in Cuba in 1978 and preliminarily as Saavedra V-5 in the Estado de Santa Cruz, Bolivia.

Figure 4. Rice planting seasons in various countries of Latin America.

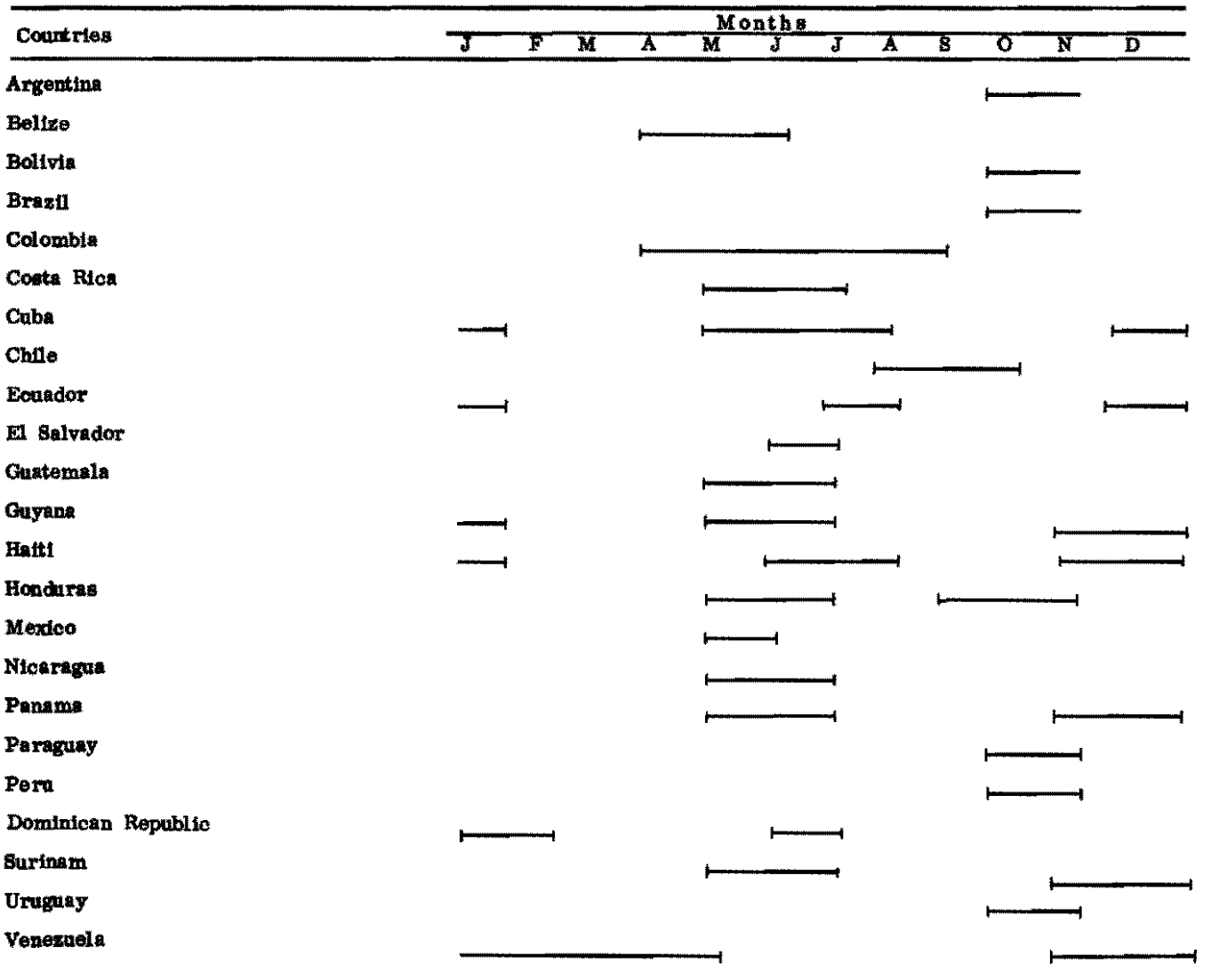

Table 2. Data received from the IRTP nurseries for Latin America distributed in 1977.

Nursery 1/	Number of sets		Percentage of data received
	Dispatched	Received	
VIRAL-P	28	18	64
VIRAL-T	28	17	61
VIRAL-S	22	13	59
VIRAL-F	5	-	-
VIAVAL	9	9	100
VIOSAL	4	-	-
TOTAL	96	57	59

1/ See the complete name in the footnote of Table 1.

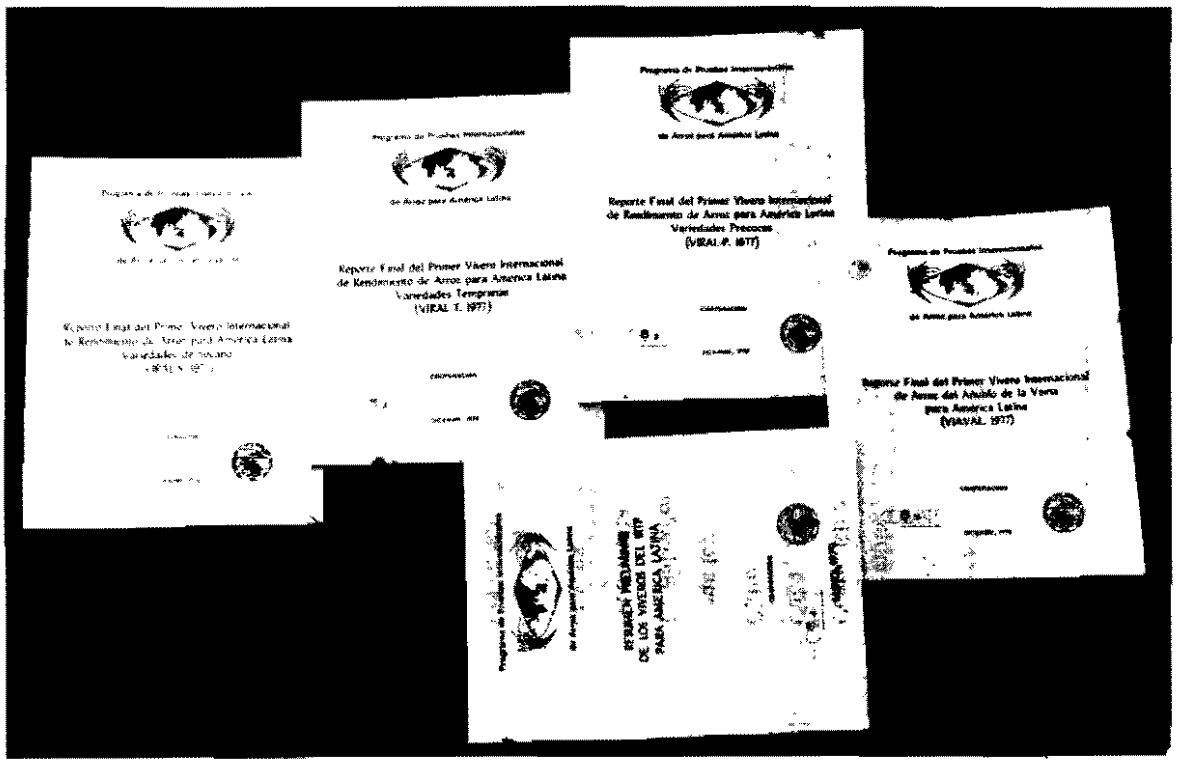

Figure 5. Final reports of four nurseries distributed in 1977 and preliminary report of various nurseries distributed in 1978.

Table 3. Average yields and growing cycles of the five best lines from the VIRAL-P for 1977, planted in 15 locations in Latin America.

Selec. No.	Designation	Yield (t/ha)		Growth duration (days)	
		Irrig.[1]	Upland[2]	Irrig.[1]	Upland[2]
2	IET 2881	6.4	4.0	122	123
5	B541b-Pn-58-5-3-1	6.2	4.5	125	128
10	CICA 7	5.3	5.5	127	131
1	BR51-46-1-Cl	5.4	5.1	127	130
6	IR 2070-414-3-9	5.1	5.2	127	130

1/ Average of 11 locations.

2/ Average of four locations with good rainfall distribution.

Table 4. Average yields and growing cycles of the five best lines from the 1977 VIRAL-T, planted in 13 locations in Latin America.

Selec. No.	Designation	Yield (t/ha)		Growth duration (days)	
		Irrig.[1]	Upland[2]	Irrig.[1]	Upland[2]
13	IR 2588-19-1-2-2	6.6	4.6	140	137
4	IET 1785	6.4	4.4	135	135
12	Bg 375-1	6.2	4.5	139	136
6	B542b-Pn-68-9-2-2	6.5	3.6	140	135
15	CICA 9	5.7	4.8	135	136

1/ Average of nine locations.

2/ Average of four locations with good rainfall distribution.

Table 5. Average yields and growing cycles of the five best lines from the 1977 VIRAL-S, planted in nine locations in Latin America.

Selec. No.	Designation	Yield (t/ha) A[1]	Yield (t/ha) B[1]	Growth duration (days) A[1]	Growth duration (days) B[1]
13	CICA 8	4.2	2.8	127	130
3	IR1529-430-3	4.3	2.3	127	132
5	IR2061-522-6-9	4.0	2.1	116	129
2	IR 36	4.0	2.6	119	124
4	IR1750-F_5-B-5	3.7	2.3	117	125

1/ A = Average of six locations with good rainfall distribution.
B = Average of three locations with drought periods.

Table 6. Rice lines highly resistant to sheath blight included in the 1977 VIAVAL planted in Tocumen, Panamá.

Designation	Origin	Type of infection
BR 1-30-1-5-1	Bangladesh	1.0
IR 1514A-E666	IRRI	1.0
IR 2070-747-6-3	IRRI	1.0
IR 2053-160-3	IRRI	1.0
Pankaj (resistant check)	India	1.0
IR 1487-194 (susceptible check)	IRRI	7.0

Table 7. Germplasm selected by the national programs from the nurseries distributed in Latin America in 1977.

Countries	Nursery, 1977	Selection number
Argentina	VIRAL-T	8,9,11,13,14
	VIRAL-P	7,10
	VIAVAL	10,11,12,14,20
Bolivia	VIRAL-S	3,7,9,12,13
Brazil	VIRAL-S	1,13
	VIRAL-P	2,3,4,5,9,10
	VIRAL-T	1,2,4,7,15
Colombia	VIRAL-F	2,4,7,8,9,10
	VIRAL-T	2,4
	VIRAL-S	2,3,8
Cuba	VIRAL-S	3
Ecuador	VIRAL-P	1,5
	VIRAL-T	1,3,5,6,7,10,12,14
	VIRAL-S	3,4,6,11
	VIAVAL	2,4,5,11,12,15,20,21
	VIOSAL	15,16,17
Guatemala	VIRAL-P	2,3,4,5,7,8,9
	VIRAL-T	4,5,6,9,11,12,13,14
Honduras	VIRAL-S	3
	VIRAL-P	9
	VIRAL-T	13,14
Nicaragua	VIRAL-P	2,4,5,6,9
	VIRAL-T	3,4,6,10,11,12,13,14
Panama	VIRAL-P	10
	VIRAL-S	13
Peru	VIRAL-P	1,8
	VIRAL-T	2,5,9
	VIRAL-S	1,2,3,4,5,8,10,11,13,14
Dominican Republic	VIRAL-P	1,4,7,8,9,10
	VIRAL-T	1,2,3,4,5,6,7,9,10,11,12,14
	VIOSAL	4,19,21,24,28,29,36,37

New IRTP Focuses and Germplasm Collection

Dr. Harold E. Kauffman made reference to IRTP activities during 1978, to the 1979 plans and to the importance of up-dating rice germplasm collection.

It was reported that in 1978, 862 nurseries were assembled at IRRI and delivered to 52 countries. In Latin America the nurseries were dispatched from CIAT to 21 countries; in West Africa the nurseries were distributed in collaboration with the International Institute for Tropical Agriculture (IITA) and the West African Rice Development Association (WARDA). Two new nurseries were initiated in 1978: International Rainfed Lowland Rice Observational Nursery (IRLRON) for Asia, and the International Rice for the Arid Regions Observational Nursery (IRARON) for the Middle East and West Asia.

From among the nurseries distributed in 1978, more than 445 selections have been used in crosses in 11 countries; 485 were promoted to yield trials in 16 countries and 430 selections tested in regional, state and national trials in 11 countries. Furthermore, 29 lines have already been named as varieties or are in the process of seed multiplication in 12 countries.

Ten monitoring tours were made during 1978: four with the objective of observing regional rice research activities (Southern India and Sri-Lanka, southern region of South America, West Africa and the Indus River Plains) and six to observe specific rice research areas (upland, deep water, cold tolerant, long duration, virus diseases and cooperative breeding projects for tolerance to drought).

In relation to future plans, it was indicated that these would be focused on strengthening the IRTP world network, giving priority to germplasm exchange through the nurseries and the monitoring tours oriented towards reinforcing national and regional research with complementary discussions on nursery planning and other international cooperation activities.

In relation to the collection of germplasm, the need to update the world collection with varieties grown in Latin America (improved and native varieties) was pointed out. National programs were requested to send seed of these materials to IRRI to complete the collection. It was also observed that collecting expeditions have been scheduled to Brazil, Colombia, Surinam, Mexico and Ecuador, since these countries are considered to have a good diversity of native and improved varieties.

Future IRTP Plans for Latin America

Various aspects related to the distribution, type, methodology and management of the nurseries, data collection and sending, monitoring tours and conferences were discussed.

Distribution of the nurseries

Participants were informed on the agreement arrived at in the Second Conference on the distribution of the nurseries. No modifications were made, except that Ecuador wants to receive the deep water varieties nursery from IRRI. Table 8 shows the types of nurseries which the different countries want to receive directly from IRRI, in addition to those which they will receive from CIAT.

Type of nurseries

Following is the list of the nurseries which CIAT will continue to distribute to national programs in Latin America:

1. Irrigated rice yield nurseries
   - Early-maturing varieties
   - Medium-maturing varieties
   - Late-maturing varieties (new)
2. Yield nursery, upland varieties
3. Observational nursery, upland varieties
4. Observational nursery, irrigated varieties
5. Disease nurseries
   - Rice blast (Pyricularia oryzae)
   - Sheath blight (Thanatephorus cucumeris)
   - Leaf scald (Rhynchosporium oryzae) (new)

6. Nurseries for climatic and edaphic problems

- Salinity
- Low temperatures (new)
- Semi-deep water

New Nurseries

Having in mind the needs expressed by the delegates at the Second Conference in 1977, four new nurseries were established to be distributed in 1979.

- International Rice Observational Nursery for Latin America-Leaf Scald (VIOAL-R)
- International Rice Yield Nursery for Low Temperatures in Latin America (VITBAL)

Table 8. IRTP nurseries which various countries will receive directly from IRRI.

Nurseries	Countries/number of sets						
	Costa Rica	Cuba	Ecuador	Mexico	Panama	Peru	Uruguay
IRYN-E		2		1		1	
IRYN-M		2		1		1	
IRYN-L		1		1		1	
IURYN				1		1	
IRON		2		1	1	1	
IURON	1			1	1	1	
IRBN		1		1		1	
ISHBN		1		1		1	
IRSATON		1		1		1	
IRCTN		1		1		1	1
IRDWON			1	1			

- International Rice Yield Nursery for Latin America-Late-Maturing varieties (VIRAL-Tar)

- Special Yield Nursery for Latin America (VERAL); this nursery was formed with 10 promising lines from the cooperative CIAT-ICA breeding program. Each of these lines combines two or three rice blast resistance factors and all have good plant type and grain quality.

Some delegates expressed the need to establish certain specific nurseries:

- A nursery with varieties showing little response to fertilizers, especially to nitrogen and phosphorus.

- Other nurseries with varieties resistant to the insects Elasmopalpus sp., Hydrellia sp. and Lissorhoptrus sp.

- A nursery with varieties tolerant to problems of acid soils.

Nurseries distributed in 1979

Of the 13 nurseries established for Latin America at the request of delegates, a total of 254 sets were delivered in 1979. Table 9 shows the type of nurseries and the number of sets sent for each country. The delivery of these nurseries was made according to planting periods of the cooperating countries, thus:

a) In March and April, for those countries with planting periods in May and June.

b) In August and September, for those countries with planting periods between October and December.

Number of Nurseries for 1980

The delegates were requested to indicate the number of sets of the 13 nurseries which they would like to receive in 1980. Table 10 lists the nurseries and the number of sets requested of each one.

Methodology and Management of Nurseries

Nomination of varieties for the nurseries in Latin America

Participants were reminded of the importance of nominating varieties for the nurseries in Latin America and, at the same time, the lack of care taken

Table 9. IRTP Nurseries for Latin America and number of sets distributed in 1979.

IRTP Nurseries		Argentina	Belize	Bolivia	Brazil	Colombia	Costa Rica	Cuba	Chile	Ecuador	El Salvador	Guatemala	Guyana	Haiti	Honduras	México	Nicaragua	Panama	Paraguay	Peru	Domin. Rep.	Surinam	Uruguay	Venezuela	TOTAL
Yield	VIRAL-P Early-mat.	1	4	1	7	1	1	2	1	1	1	1	1	1	2	3	1	2	1	1	1	1	1	3	39
	VIRAL-T Medium-mat.	1	3		4	2	1	1		1	1	1	1	1	2		1	2	1	1	1			3	28
	VIRAL-Tar. Late-mat.							2		1			1	1		3					1				9
	VIRAL-S Upland		2	1	2	1	1			2	1	1	1	1	2	6	1	2	1	2				3	30
	VERAL		1	1	3		1	1		1	1	1	1		1	2	1	1	1	1	1		1	2	22
Observational	VIOAL Irrigated	1	1		3			1					1		2		1	1		1				2	14
	VIOAL-S Upland		1	2	5		1					1	1		2	6		2		1				3	25
Diseases	VIPAL Rice blast		2	1	6	1	2	1		1	1	1	1		1	6		1		1	2		1	2	31
	VIOAL-R Leaf scald				3	1		1		1	1	1			1	2	1	2		2	1			1	18
	VIAVAL Sheath blight		1		1		2	1		1			1				1	1		1				2	12
Climatic and edaphic problems	VIOSAL Salinity		1		1			1		1			1			1				1	1				8
	VITBAL Low temp.		1	1	2			2								1				1	1		1		10
	VIRAL-F Deep water		1		2	2	1			1			1												8
TOTAL		3	18	7	39	8	10	13	1	11	6	7	11	4	13	30	7	14	4	13	9	1	4	21	254

Table 10. IRTP nurseries for Latin America and number of sets requested for 1980.

IRTP Nurseries		Argentina	Belize	Bolivia	Brazil	Colombia	Costa Rica	Cuba	Chile	Ecuador	El Salvador	Guatemala	Guyana	Haiti	Honduras	México	Nicaragua	Panamá	Paraguay	Peru	Dom. Republic	Surinam	Uruguay	Venezuela	TOTAL
Yield	VIRAL-P Early-mat.	1	4	1	5	2	1	2	1	1	1	2	2	1	4	3	1	1	1	1		1	1	2	39
	VIRAL-T Medium-mat.	1	2	1	3	2	1	1		1	1	2	2	1	4		1	1	1	1				2	28
	VIRAL-Tar. Late-mat.				1			1		1	1		2	1		3				1					11
	VIRAL-S Upland		2	1	2	4	2			1	1	2	2	1	2	6	1	2		1	1			4	35
	VERAL	1	1		2		1	1		1	1	2	2	1	2	2	1	2	1	1	1	1		2	26
Observational	VIOAL Irrigated	1	1		4			1		1			1	1	2		1	1	1	1				2	18
	VIOAL-S Upland				4					1	1	1	1	1	2	6		2		1				4	24
Diseases	VIPAL Rice blast		2		3	1	2	1		3	1	1	3		1	6		2		4	1		1	4	36
	VIOAL-R Leaf scald				1	1	2	1			1	1	1		1	2	1	1		2				1	16
	VIAVAL Sheath blight		1		1	2		1					2			2	1	1		1	1			2	15
Climatic and edaphic problems	VIOSAL Salinity		1		1			1					2	1		2				1	1				10
	VITBAL Low temp.	*	1		2	1		1	1											1			1		8
	VIRAL-F Deep water		1		1	2										1								2	7
TOTAL		4	16	3	30	15	9	11	2	10	8	11	21	8	18	32	7	13	4	16	5	2	3	25	273

in the procedure for their dispatch. The delegates were informed that seed of varieties nominated in the Second Conference was not sent, or if sent, did not reach its destination.

To avoid problems in customs and in order to reduce shipping costs, it was agreed that 20 grams of seed of each variety nominated would be dispatched to the following address:

Dr. J. L. Nickel
CIAT - Director General
c/o Dr. M. J. Rosero
Zona Aduanera CIAT
Cali, Colombia, S.A.

Table 11 shows the germplasm that was nominated by the delegates from the various countries for the 1980 IRTP nurseries.

Data collecting and reporting

Several aspects related to collecting and reporting data were discussed. Several faults were found in the data from certain 1977 nurseries, these data were not included in the combined analysis. To avoid these problems in the future, the delegates were requested to collect data (days to flowering, maturity, plant height, lodging incidence and yield) on all nursery lines and all replications. In relation to reporting, it was indicated that data are not arriving in time to the IRTP Coordinator for Latin America, and this is delaying the data analysis and the report of final results. So that final results reach the cooperators on time, two deadlines were suggested for receiving data: in November for those countries planting the nurseries during May and June of the same year, and in June for those countries planting the nurseries in October and December of the previous year.

If data are received on the dates indicated, they would be processed and analized in July and August; final reports would be prepared between September and November; and deliveries would be made in December or January.

IRTP Meetings for Latin America

Participants were informed that this activity will continue to be held at CIAT, Palmira, Colombia, every two years. It was agreed that the most appropriate period for the meeting is in August, since at this time, the results of all nurseries distributed during the previous year could be discussed.

Table 11. Germplasm nominated for the IRTP Nurseries for Latin America in 1980.

Countries	Name or number of the variety	Type of 1980 nursery
Brazil	IRGA 409	VIRAL-T
	Line P798-B4-4-1T	VIRAL-T
	IAC 47, 25, 164, 165	VIRAL-S
	Selección Amarillo	VIRAL-S
	IRAT 106	VIRAL-S
Colombia	Lines 5002, 5005, 5010	VIRAL-T, VIPAL
Cuba	IR 880C-9	VIRAL-T
	Caribe 1	VIRAL-T
Ecuador	INIAP 415	VIRAL-T
Guyana	Rustic	VIRAL-P, VIRAL-S
	75704, 75708	VIRAL-T
	T, BG 60-283	VIOSAL
Haiti	Ti Fidele	VIRAL-S
Peru	PNA 221	VIRAL-T
	PNA 115	VIRAL-S
	PNA 237	VIOAL
Dominican Republic	J 246, J 222	VIRAL-T
	J 245	VIPAL
Uruguay	Selección 976, Line 428	VITBAL
Surinam	Eloni	VIRAL-T
	7231/8; 73114/2, 73151/6	VIOAL

Aspects of the visit to CIAT's rice plots.

Miralba Agudelo, Technician in CIAT' Rice Program, shows Conference participants the methodology for evaluating improved material for resistance to Sogatodes.

Delegates from Brazil requested that the next IRTP meeting includes a discussion on drought problems involved in upland rice cultivation, as the central subject for the conference.

Monitoring Tours

The experience acquired during the monitoring tours to Central America and the southern region of South America demonstrated that these activities are very useful, especially for evaluating the IRTP nurseries, detecting problems in rice cultivation and observing the research activities conducted by the national programs in countries visited. Furthermore, it is a great opportunity for the research leaders and/or assistants in the region to become acquainted with the development of rice production in other countries.

These monitoring tours will continue to be held depending on IRTP budget availabilities and, if possible, will coincide with national or regional conferences or symposia.

In 1979, a monitoring tour will be made to the northern region of South America to observe the development of rice production and research and to evaluate IRTP nurseries in Ecuador, Colombia, Venezuela, Guyana and Surinam. This trip was programmed to take place immediately after the conference, with the participation of technicians from CIAT, IRRI, WARDA, IRAT and national programs in the five countries.

A monitoring tour has been programmed for October 1980 to countries in Central America and to some countries in the Caribbean (Cuba, Dominican Republic and Haiti).

PRESENTATION OF REPORTS OF THE COUNTRIES PARTICIPATING

With the objective of updating data on area cultivated, production, yield, varieties grown and rice production problems in Latin America, the national program leaders prepared detailed reports including this information. (Those program leaders not present at the conference — Argentina, El Salvador and Mexico — sent the information).

Rice Area, Production and Yield in Latin America

Table 12 summarizes the data on rice area, production and yield for the 1977-78 harvest in Latin America. In summary, 7,426.600 ha were planted,

Table 12. Rice area, production and yield in Latin America (1977/78 harvest)[1/].

Countries	Area ('000 ha)			Production ('000 t)			Yield (t/ha)	
	Irrig.	Upland	Total	Irrig.	Upland	Total	Irrig.	Upland
Argentina	100.0	—	100.0	330.0	—	330.0	3.3	—
Belize [2/]	4.4		4.4	6.2		6.2	1.4	—
Bolivia	—	53.7	53.7	—	86.2	86.2	—	1.6
Brazil	791.8	4776.3	5568.1	2508.0	4968.0	7476.0	3.2	1.0
Colombia [3/]	311.2	95.0	406.2	1572.2	142.5	1714.7	5.1	1.5
Costa Rica	4.0	71.7	75.7	16.0	179.9	195.9	4.0	2.5
Cuba	151.0	—	151.0	450.0	—	450.0	3.0	-
Chile	33.0	—	33.0	104.8	—	104.8	3.2	-
Ecuador	38.6	40.5	79.1	123.5	109.4	232.9	3.2	2.7
El Salvador [2/]	—	13.9	13.9	—	50.1	50.1	-	3.6
Guatemala	—	11.5	11.5	—	26.0	26.0	-	2.3
Guyana	86.4	35.2	121.6	259.2	52.8	312.0	3.0	1.5
Haiti	30.0	10.0	40.0	90.0	18.0	108.0	3.0	1.8
Honduras	4.0	16.0	20.0	12.0	27.2	39.2	3.0	1.7
Mexico	70.5	52.2	122.7	303.3	120.1	423.4	4.3	2.3
Nicaragua	15.1	4.4	19.5	68.0	6.0	74.0	4.5	1.4
Panama	1.1	108.8	109.9	4.0	184.9	188.9	3.6	1.7
Paraguay	20.7	11.1	31.8	43.4	14.8	58.2	2.1	1.3
Peru [3/]	93.5	28.5	122.0	453.9	48.8	502.7	4.9	1.7
Dominican Rep.	98.8	-	98.8	299.8	-	299.8	3.0	-
Surinam	40.0	-	40.0	172.0	-	172.0	4.3	-
Uruguay	58.4	-	58.4	243.6	-	243.6	4.2	-
Venezuela	109.3	36.0	145.3	364.9	54.0	418.9	3.3	1.5
TOTAL	2061.8	5364.8	7426.6	7424.8	6088.7	13513.5	3.6	1.1

1/ Data supplied by national program leaders who attended the Third IRTP Conference for Latin America held at CIAT on May 30 - June 2, 1979.

2/ Data for 1976.

3/ In Colombia, in the irrigated area, 51,762 ha of mechanized upland are included; in Peru, in the upland area, 8,500 ha planted in "barriales" are included.

28.0% under irrigation and 72.0% under upland conditions. A total of 13,513.500 tons of paddy rice were produced: 55.0% of this total was grown under irrigation.

Commercial Rice Varieties in Latin America

The commercial varieties, percentage of area and growing systems in Latin America are presented in Table 13.

To have an idea of the percentage of area planted with high-yielding semi-dwarf varieties, the varieties from the different countries were grouped in four types: semi-dwarf, USA improved type, tall improved, and traditional (other, natives or landraces). These data appear in Table 14. In four countries (Argentina, Chile, Haiti and Uruguay) the semi-dwarf varieties are not grown, possibly due to the fact that in some of them (Chile, Haiti) their cultivation has not been tried and in the other, because they prefer varieties for exporting. In 13 countries the adoption of the high-yielding varieties varies between 28 and 100%. In Bolivia and Panama, the adoption is 3 and 10%, respectively. Considering all countries in Latin America, only 15% of the area was planted in 1977-78 harvest with high-yielding varieties (semi-dwarf). This percentage is low primarily because the majority of the area cultivated is in Brazil where upland rice is predominant and the semi-dwarf varieties are not well adapted to this system. Excluding Brazil, the data indicate that 56.0% of the area is planted to high-yielding semi-dwarf varieties (Table 14).

Problems of Rice Crop in Latin America

In general, problems affecting rice production in Latin America are related to diseases, insects, rodents, weeds, soils, climate, water control, droughts, varieties, certified seed, drying and storing, marketing, machinery, production costs, limited resources for research and technology transfer and lack of trained personnel.

Diseases and insects

Rice blast (P. oryzae) was mentioned by all the delegates as the principal disease limiting rice production under irrigated and upland systems.

Sheath-blight (T. cucumeris) and leaf scald (R. oryzae) were reported by various countries as diseases becoming economically important to rice production.

Table 13. Main rice varieties grown in countries of Latin America during the 1977-1978 harvest.

Countries	Area ('000 ha)	Name of the variety	% Area	Planting system 1/
Argentina	100.0	Fortuna	37.0	I
		Bluebonnet 50	36.0	I
		Itapé	14.0	I
		Bluebelle	5.0	I
		Other	8.0	I
Bolivia	53.7	Bluebonnet 50	55.0	U
		Dourado	25.0	U
		Pico Negro	10.0	U
		90 días colorado	5.0	U
		CICA 6	3.0	U
		Other	2.0	U
Belize	4.4	CR 1113	50.0	I
		La Belle	30.0	I
		CICA 4, CICA 7, CICA 9, Century Patna, Texas Patna	20.0	I
Brazil	5568.1	IAC 47	22.8	U
		IAC 5544	13.7	U
		IAC 1246	10.8	U
		Patrao Precoce	5.7	U
		Bluebelle	5.5	I
		IAC 25	3.9	U
		Lageado	1.9	I, U
		Bico Ganga	0.9	U
		Amarelao	0.8	U
		Batatais	0.8	U
		Other	32.9	U
Colombia	406.2	CICA 4	19.9	I, U
		CICA 9	18.4	I, U
		IR 22	16.8	I
		CICA 7	12.3	I
		CICA 6	7.6	I, U
		IR 8	1.1	I
		Bluebonnet 50	0.4	I, U
		Traditionals	23.4	U
Costa Rica	75.7	CR 1113	93.0	U, I
		CICA 7, CR 5272, CICA 9	7.0	U

(continues)

Table 13 (continued)

Countries	Area ('000 ha)	Name of the variety	% Area	Planting system 1/
Cuba	151.0	IR 880	85.0	I
		Naylamp	15.0	I
Chile	33.0	Oro	90.0	I
		Lonquen Amarillo	9.0	I
		Diamante-INIA, Quella-INIA, Niquen-INIA	1.0	I
Ecuador	79.1	INIAP 6	55.0	I
		IR 8	10.0	I
		Canilla	10.0	U
		Brasilero	5.0	U
		SML	5.0	U
		Tapuripa	4.0	I, U
		Naylamp	4.0	I, U
		Other	7.0	U
El Salvador	13.9	Nilo 1	28.3	U
		X-10	27.5	U
		CICA 4	19.0	U
		Nilo 2	4.9	U
		Nilo 3	3.6	U
		Nilo 11	3.3	U
		Masol	3.1	U
		Other	10.2	U
Guatemala	11.5	Tikal 2	50.0	U
		Le Bonnet	25.0	U
		Americanito	10.0	U
		Bluebelle	5.0	U
		Bluebonnet 50, Lira Grueso, Lira Blanco, Lirita	10.0	U
Guyana	121.6	Starbonnet	62.0	I, U
		N	17.0	I, U
		Rustic	3.0	I, U
		Traditionals	18.0	I, U
Haiti	40.0	Dawn, Starbonnet, Bluebonnet	40.0	I
		Ti Fidele, Buffalo, L.C.C., Rexoro y LaBelle	60.0	U

(continues)

Table 13 (continued)

Countries	Area ('000 ha)	Name of the variety	% Area	Planting system 1/
Honduras	20.0	CICA 6	70.0	I, U
		IR 100	15.0	I
		Bluebonnet	10.0	U
		CICA 9	1.0	I
		Natives	4.0	U
Mexico	122.7	Navolato A71	20.4	I, U
		Morelos A70, Zapata A70	14.0	I
		Bamoa A75	7.9	I
		CICA 4	10.2	I, U
		CICA 6	8.2	I, U
		Juchitan A74	5.9	I
		Joachin A74 y Piedras Negras A74	3.9	I
		Milagro Filipino (IR 8)	3.8	I, U
		Grijalva A71, Macuspana A75, Sinaloa A64, Sinaloa A68	12.7	U
		Bluebonnet 50	2.1	U
		Natives	10.3	U
Nicaragua	19.6	IR 22	30.3	I
		IR 100d	29.6	I
		CR 1113	9.4	I, U
		CICA 4	8.5	I, U
		Bluebonnet	11.2	U
		Other	10.2	I
Panama	109.9	Varieties from Surinam: Nilo 1, Nilo 2, Bowani, Ciwini, Diwani, Eloni	60.0	U
		CICA varieties	10.0	U
		Other (Damaris, Anayansi, CR 1113, IR 8)	30.0	U
Paraguay	31.8	Fortuna	15.6	I
		Bluebonnet 50	13.6	I
		CICA 6	13.0	I
		Bluerose	7.8	I
		CICA 7, CICA 9, CICA 8	2.6	I
		CICA 4, IR 22, Japonés 1	12.4	I
		Brasilians	35.0	U

(continues)

Table 13 (continued)

Countries	Area ('000)	Name of the variety	% Area	Planting system 1/
Peru	122.0	Inti	21.7	I
		Naylamp	17.6	I
		IR 8	6.1	I
		Chancay	3.4	I
		Radin China	13.5	I, U
		Minabir	9.4	I, U
		Carolino	9.8	I, U
		Fortuna	4.1	U
		Other	13.9	I, U
Dominican Republic	98.8	High-yielding varieties: (IR 6, Juma 57, Juma 58, Tanioka, CICA 4, CICA 9)	34.0	I
		Traditional varieties: (Toño Brea, Mingolo, Inglés largo, Higueyana, Diente de gato)	50.8	I
Surinam	40.0	Diwani	70.0	I
		Pisari, Camponi, Eloni	30.0	I
Uruguay	58.4	Bluebelle	85.0	I
		EEA 404	10.0	I
		Selección 976	5.0	I
Venezuela	145.3	CICA 4	86.9	I, U
		Araure 1	10.3	I, U
		Llanero	2.7	U

1/ I = Irrigated
U = Upland

Among the insects of major economic importance are stink bugs, armyworms and rice plant hoppers. Table 15 provides a summary of the diseases and insects reported to be affecting rice production in Latin American countries.

Table 14. Percentage and total rice area planted with different varieties in Latin America, 1977-1978.

Countries	Type of varieties/Percentage of the area								
	Semi-dwarf		Improved type USA		Improved tall		Traditional		Total
	%	Area ('000 ha)	%	Area ('000 ha)	%	Area ('000 ha)	%	Area ('000 ha)	Area ('000 ha)
Argentina	-	-	41.0	41.0	51.0	51.0	8.0	8.0	100.0
Belize	60.0	2.7	40.0	1.8	-	-	-	-	4.5
Bolivia	3.0	1.6	55.0	29.5	40.0	21.5	2.0	1.1	53.7
Brazil	1.8	98.3	5.5	306.2	61.6	3430.0	31.1	1733.6	5568.1
Chile	-	-	-	-	100.0	33.0	-	-	33.0
Colombia	76.1	309.1	0.5	2.0	-	-	23.4	95.0	406.1
Costa Rica	100.0	75.7	-	-	-	-	-	-	75.7
Cuba	100.0	151.0	-	-	-	-	-	-	151.0
Ecuador	69.0	54.6	-	-	9.0	7.1	21.0	16.6	78.3
El Salvador	49.6	6.9	-	-	40.1	5.6	10.2	1.4	13.9
Guatemala	50.0	5.8	50.0	5.7	-	-	-	-	11.5
Guyana	20.0	24.3	62.0	75.4	-	-	18.0	21.9	121.6
Haiti	-	-	40.0	16.0	-	-	60.0	24.0	40.0
Honduras	86.0	17.2	10.0	2.0	-	-	4.0	0.8	20.0
Mexico	55.1	67.6	2.1	2.6	32.5	39.9	10.3	12.6	122.7
Nicaragua	77.8	15.3	11.2	2.2	-	-	10.2	2.0	19.5
Panama	10.8	11.0	-	-	60.0	65.9	30.0	33.0	109.9
Paraguay	28.0	8.9	21.4	6.8	15.6	5.0	35.0	11.1	31.8
Peru	48.8	59.6	-	-	36.8	44.9	13.9	17.0	121.5
Dominican Rep.	34.0	33.6	-	-	-	-	50.8	50.2	83.8
Surinam	100.0	40.0	-	-	-	-	-	-	40.0
Uruguay	-	-	85.0	49.6	15.0	8.8	-		58.4
Venezuela	97.2	141.2	-	-	-	-	2.7	3.9	145.1
Total area ('000 ha)		1124.4		540.8		3712.7		2032.2	7410.1
Percentage of total		15.2%		7.3%		50.1%		27.4%	
NOTE: Excluding Brazil	55.7	1026.1	12.7	234.6	15.3	282.7	16.2	298.6	1842.0

Table 15. Diseases and insects attacking the rice crop in Latin America, reported by delegates participating in the Third IRTP Conference for Latin America.

Countries	Diseases							Insects and Nematodes									
	Rice blast	Sheath blight	Leaf scald	Brown spot	"Hoja blanca"	Straighthead	Bacterial blight	Stink bugs	Borers	Fall armyworms	Cutworms	Plant hopper	Leaf miners	Grass leaf hopper	Water weevils	Leaf rollers	Nematodes
Argentina	X			X		X		X	X						X		
Belize										X		X					
Bolivia	X			X				X		X							
Brazil	X	X	X	X							X		X		X		X
Colombia	X	X	X					X		X			X				
Costa Rica	X		X	X				X		X	X	X					
Cuba 1/	X	X		X	X												
Dominican Republic					X												
Ecuador	X				X				X								
El Salvador	X		X					X		X							
Haiti								X									
Guatemala	X		X	X	X			X	X	X				X		X	
Guyana 1/	X	X		X	X												
Honduras	X	X		X													
Mexico	X	X	X	X				X	X								
Nicaragua	X																
Panama	X	X	X														
Paraguay	X			X				X	X						X		
Peru	X		X	X	X		X		X			X	X				
Surinam 2/	X	X	X	X				X	X	X		X	X				
Uruguay	X	X															
Venezuela	X											X					

1/ Not economically important to production.
2/ Diseases are not limiting but insects are.

Weeds, climate and soils

Table 16 shows the countries in Latin America which have problems with weeds, climate and soils. In relation to seeds, the grasses, Echinochloa colonum, Digitaria sanguinalis, and Rottboellia exaltata were reported by the majority of the delegates participating.

Management of water and varieties

The problems of water management are mainly related to inadequate irrigation for the crop and deficiencies in the drainage systems. As to varieties, problems are related to the lack of high-yielding varieties, with good quality and that are early maturing, resistant to drought and vigorous. Another problem is the inadequate supply of certified seed of those varieties available at the moment (Table 17).

Problems with machinery, rice processing and economic factors

Various delegates from the Latin American countries reported as factors limiting production: the lack of machinery (tractors, combines, and spare parts), inadequate facilities for rice processing (drying, storage and milling) and economic problems inherent to internal consumption rice marketing, to exporting and high production costs (Table 18).

Research resources and need for trained personnel

These factors were considered by the delegates as basic for improving rice production and productivity in Latin America. Table 19 indicates the needs of trained personnel for the period 1979-1984, as well as the lack of resources for research indicated by various delegates. In summary, for the 1979-1984 period, the national programs requested training for 104 technicians in short courses, 55 technicians at the masters level and 10 at the Ph.D. level.

Rodents and other animals

Some delegates mentioned rodents as a problem, limiting rice production. The delegate from Venezuela mentioned rodents, specifically rats, as a serious problem in rice production.

Table 16. Weed, climate and soil problems affecting rice production in Latin America. Data reported by the delegates participating in the Third IRTP Conference.

Countries	Weeds			Climate			Soils 3/			
	Narrow leaf 1/	Eroad leaf 2/	Red rice	Low temp.	Deep water	Drought	Salinity	Acid	Alkaline	Organic
Argentina			X							
Belize	X									
Bolivia	X					X				
Brazil	X	X		X		X	X	X	X	
Chile	X	X								
Colombia		X	X					X		
Costa Rica	X		X			X		X	X	
Cuba	X	X								
Ecuador	X	X			X					
El Salvador	X	X	X			X		X		
Haiti					X	X				
Honduras	X	X								
Guatemala	X	X	X					X		
Guyana	X	X			X					
Mexico	X		X			X			X	
Nicaragua			X			X				
Panama	X		X			X		X		
Paraguay	X		X							
Peru				X		X	X	X		
Dominican Republic							X		X	X
Uruguay	X			X						
Surinam	X		X							
Venezuela	X									

1/ Narrow leaf weeds include grasses and cyperus: Echinochloa colonum, E. crusgalli, Digitaria sanguinalis, Rottboellia exaltata, Ischaemum rugosum, Leptochloa filiformis, Cynodon dactylon, Leptochloa fascicularis, Ixophorus unicetus; and Cyperus rotundus. Not all these species are present in the countries listed.

2/ Broad leaf: Amaranthus spinosus.

3/ Acid soils with Fe and Al toxicity and P deficiency. Alkaline soils with Zn deficiency problems.

Table 17. Water management problems and varietal characteristics required for increasing rice production in Latin America. Data reported by the delegates participating in the Third IRTP Conference.

Countries	Water management		High-yielding varieties					
	Ir rig.	Drainage	Late	Early	Grain quality 1/	Drought resistant	Vigor 2/	Certified Seed
Argentina	X	X			X			X
Belize	X	X						X
Bolivia						X		
Brazil			X	X	X	X	X	X
Chile								X
Colombia					X			X
Costa Rica					X		X	
Cuba	X	X						
Ecuador	X	X			X		X	
El Salvador					X	X	X	
Haiti								X
Honduras								X
Guatemala					X		X	
Guyana	X	X						
Mexico	X			X	X	X		
Nicaragua				X	X			
Panama	X	X				X		X
Paraguay	X	X			X			X
Dominican Rep.	X	X						
Uruguay				X	X			
Venezuela	X			X	X		X	

1/ Long grain varieties, good milling yield, vitreous appearance and intermediate amylose content.

2/ Vigor during the seedling stage and resistance to lodging.

Table 18. Problems related to machinery, rice processing and economical factors limiting rice production in various countries of Latin America. Data reported by the delegates participating in the Third IRTP Conference.

Countries	Lack of machinery			Inadequate processing		Economic factors		
	Tractors	Combines	Spare parts	D.S.[1]	Mills	Marketing: Domestic	Marketing: Foreign	High production costs
Argentina						X		X
Bolivia				X				
Colombia						X	X	X
Costa Rica							X	X
El Salvador						X		
Honduras	X	X						
Guatemala				X	X	X		
Guyana		X	X					
Nicaragua						X		
Panama		X	X	X		X		
Paraguay						X		
Venezuela								X

1/ D.S. = Drying and storage.

Table 19. Training needs and lack of resources for research of the national rice programs in Latin America. Data reported by the delegates participating in the Third IRTP Conference.

Countries	Trained personnel/Number of technicians [1]																										Lack of resources for research
	Short Courses [2]										M.S.										Ph. D.						
	Farm management	Irrigation	Production	Breeding	Plant pathology	Entomology	Agronomy	Extension	Seed production	Data processing	Agric. Engineering	Breeding	Agric. Economics	Agronomy	Soils	Plant pathology	Production systems	Entomology	Physiology	Seed technology	Breeding	Agronomy	Plant pathology	Entomology	Seed technology		
Belize		1	1				1																				
Bolivia							1	1						1				1									
Brazil			1		2	1	1									1											
Chile		1			1	1		1						1													
Colombia												1		1					1		1	2			1		X
Costa Rica																											X
Cuba			10	5																							
Ecuador			3	4		1						2		2		1											
Haiti	2		7					1			1	1								1							
Honduras			1									1				1		1									
Guyana				3		1	16		1			2		1													
Mexico			4	6								4		3		2		2			4		1				
Nicaragua			2				2					1		1													
Peru		1		1	1		1		1		1	1	1	2	1	1		1		1							
Paraguay			3	2								1															X
Peru			1			1			1	1		4			2	2	1	1			1						
Dominican Republic		1		1	1	1	2																				
Surinam			1																								
Venezuela												1															X

1/ Programming for the 1979-1984 period.
2/ Short courses (3-6 months).

The presence of snails during planting was considered as a serious problem in Surinam. The delegate from Haiti reported rats, birds and frogs as limiting factors. The latter have destroyed the seed beds; due to the severity of the problem dogs had to be trained to scare them away or kill them.

CURRENT STATUS AND FUTURE PLANS OF CIAT'S RICE PROGRAM

Joaquín A. González (I.A., MS), Coordinator of CIAT's Rice Program, talked about such matters as the importance of rice in Latin America, the problems most common to the crop, the historical background of CIAT's Rice Program, its accomplishments and current objectives and strategies, and its future plans.

Objectives and Strategies of CIAT's Rice Program

The basic objectives of CIAT's Rice Program is the development and transfer of improved varieties and technology to meet producer and consumer needs in Latin America.

Fulfillment of this objective is being achieved through the following strategies:

- Obtaining high-yielding varieties with good grain quality and resistance to diseases and pests.
- Designing and evaluating techniques which enable exploiting the maximum production capacity of the varieties, at minimum production costs.
- Transferring new technology to national programs and other institutions through the International Rice Trials or the regional trials, and by strengthening research and extension personnel through training in short courses at CIAT or in regional courses.
- Promoting the use of the continuous rice production system, developed at CIAT for Latin America.

Future Plans of CIAT's Rice Program

Enlarging of the Rice Program

In the near future, CIAT's Rice Program will broaden its research activities to favored upland rice cultivation systems in Latin America. To this end, the Program's present scientific personnel (one breeder, one plant pathologist, and one specialist in agronomy) will be reinforced by another breeder, a physiologist, and an economist. In this way, the efforts to resolve irrigated and favored upland rice production problems in Latin America, will continue.

Technology generation and transfer at the regional and international level

Necessary support will continue to be given to research for the generation and transfer of technology to countries in Central America and the Caribbean.

The IRRI Liaison Scientist for Latin America, Dr. Manuel J. Rosero will continue to develop his current activities and will broaden them according to the needs of the national programs.

Training

Personnel training activities, with emphasis on techniques on converting favored upland rice into irrigated rice, will continue.

Integrated research

Research has an integrated focus which will enable formulating a technological package (variety, cropping agronomy and water management) for general or specific applications.

Technical assistance

It is very important to maintain a technical consulting service to meet technical assistance requests of the countries in their national and regional production campaigns.

DISCUSSION ON RECENT PROGRESS AND PLANS FOR RESEARCH AND BREEDING FOR RESISTANCE TO RICE BLAST

Considering that rice is the main disease limiting rice production in Latin America, a discussion on the research advances in this field was programmed for the Third IRTP Conference for Latin America; the discussion included aspects on varietal resistance and future plans of the genetic improvement programs.

Presentation of Reports

To establish the basis for discussing the problem, plant pathologists J. P. Crill, from IRRI, I. Buddenhagen, from IITA, and D. R. MacKenzie, from Pennsylvania State University (U.S.A.), and rice breeders N. Van Tan, from the Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), and C. P. Martínez, from the Instituto Colombiano Agropecuario (ICA), were invited to speak on the advances and plans of rice genetic improvement for resistance to rice blast.

Following is a summary of the most outstanding aspects of the presentations and discussions.

Dr. Crill emphasized the precise definitions of the terminology related to the resistance reaction and host susceptibility. It was indicated that the present system for measuring the severity of the reaction, based on the type of leaf lesions (1-4 scale) and on the quantitative estimation of the leaf area affected (5-9 scale) (grades 1-3, resistance; 4-6 tolerance or horizontal resistance; 7-9, susceptibility) do not evaluate the host's resistance from the genetic point of view, since the grades 1, 2 and 3 are included in one definition to show resistance. To avoid confusion with the variability of the pathogen, it is necessary to evaluate the host's resistance reaction for each grade expressing resistance. The description of the symptoms in each degree of resistance was the following:

Grade 0: When it is not possible to distinguish the symptom on the leaf at plain sight, nor with the help of a low-power lens. This grade indicates resistance and is equal to immunity.

Grade 1: Small spots, the size of a pin head, and of brown color, are a typical hypersensitive reaction.

Grade 2: Similar to grade 1, except that the spots are slightly larger. This is also a hypersensitive reaction.

Grade 3: Gray, necrotic rounded spots, slightly oval in shape, 1-2 mm in diameter with brown margins. This is a susceptible reaction but highly tolerant or presenting horizontal resistance.

Dr. Crill indicated that in these reaction grades there are three types of resistance, which must be exploited by breeders and plant pathologists in the developing of rice varieties resistant to rice blast: a) monogenic resistance represented by the grade 0 reaction; b) hypersensitive resistance characterized by reaction grades 1 and 2; and c) tolerance, or horizontal or multigenic resistance characterized by reaction grades of 3 up to 5, according to the international evaluation scale. Emphasis was placed on the need to determine what type of host reaction would be most desirable to use in a breeding program, as well as the need of having a basic understanding of the resistance genes in the rice varieties and of the pathogenic genes in the fungus population.

Dr. Buddenhagen indicated that IITA's Rice Program has as one of its main objectives the incorporation of an intermediate or moderate level of resistance. To this end, various selection techniques are being tried in the field under upland conditions to identify material with stable resistance. In West Africa there are a great number of rice varieties with stable resistance, which have been selected by the farmers, but these are tall and have low yields. The fact was emphasized that the incorporation of stable resistance into improved rice material is necessary and that there are mechanisms to achieve this which must be explored. Mutation can be a useful means to obtain semi-dwarf varieties with stable resistance from the tall varieties with stable resistance, without significantly changing their genetic base. Dr. Buddenhagen's experiences indicated that varieties easily change their reaction to the pathogen depending on the environmental conditions (in poor environments the disease does not show), the planting density (in broad spacings the incidence is lower), the cultural system (under irrigation and upland with high moisture, the development of the disease is less), and the number of tests (only one test does not indicate resistance). Finally, the researchers were urged to decide when making a selection, what is an adequate trial site and what level of resistance is desired to satisfy the needs of the region.

Dr. N. Van Tan reported on the rice blast research activities of EMBRAPA's Rice Program in the Centro Nacional de Pesquisa - Arroz Feijão (CNPAF). Current research is concentrated on: a) the germplasm test for identifying sources of resistance in the native and introduced material; b) the evaluation of horizontal resistance in locally adapted varieties; c) determining the param-

eters for measuring horizontal resistance in segregating populations; and d) selecting varieties with vertical resistance, through backcrosses and formation of multilines.

The new strategies are concentrated on: a) diversification of resistant varieties — including the incorporation of vertical resistance genes into the varieties cultivated under upland conditions, such as IAC 47, IAC 5544, IAC 25, Pratao Precoce; b) the formation of multilines from the strategy described in (a); c) pyramiding of vertical resistance genes in a desirable variety; and d) obtaining varieties with horizontal resistance. This strategy will be in operation after determining the evaluation methodology and the inheritance of horizontal resistance.

Dr. D. R. MacKenzie presented and discussed in detail 15 concepts of horizontal resistance held by different scientists. He indicated that an operational definition does not exist and proposed that horizontal resistance be considered as an apparent reduction of the infection rate.

A practical electronic computer is available for predicting weather conditions and ordering the application of fungicides when humidity and temperature conditions favor the development of the disease.

Dr. C. P. Martínez reviewed ICA/CIAT's cooperative work related to breeding for resistance to rice blast. Various alternatives are being explored for obtaining rice varieties with stable resistance, but the advances are restricted by the lack of information on genetic, pathogenic and epidemiologic aspects of the fungus. There is no information on the number of genes present in those varieties which are a source of resistance, such as Tetep, Carreon, Dissi Hatif, C 46-15 and Mamoriaka; nor is there information on the similarities or differences between functional genes of these varieties. However, efforts have been concentrated on: a) incorporating resistance from major genes to the promising material through single, double and triple crosses; and b) pyramiding of major genes from different sources into one variety. Eleven lines have been selected to be evaluated in yield and regional trials in Colombia and in other countries of Latin America through the IRTP. However, it cannot be ascertained yet that pyramidal grouping has been achieved; c) selection of multiline varieties with different resistance genotypes; d) improvement for horizontal resistance through the concentration of minor genes, recurrent selection to give strengthen horizontal resistance, and by combining vertical and horizontal resistance (this last strategy is still in the planning stage).

Dr. S. W. Ahn, CIAT's Rice Program plant pathologist, indicated future research plans in relation to rice blast:

1. Examination of the genetic diversity in the sources of resistance and in the pathogen by means of the use of differential varieties for Latin America.

2. Evaluation of genetic material in the Rice Program and the germplasm introduced.

3. Genetic studies on the interaction between host and pathogen.

4. Simulation and evaluation of the different projects for utilizing sources of resistance.

5. Integrated management for controlling the disease.

Identification and Development of Methods of Breeding for Resistance to Rice Blast

Since there is no adequate methodology to induce a good rice blast infection on the segregating populations under field conditions, nor is there a methodology for identifying those plants with horizontal resistance, the discussion on this subject had the objective of collecting suggestions and ideas which would focus breeders' research on more practical and safe paths. It was suggested that the international centers and national institutions give priority to the identification of: a) sources of horizontal resistance; b) techniques to isolate, in the segregating populations, those plants with horizontal resistance; and c) techniques for inducing under field conditions, good rice blast infections, especially on the neck of the panicle.

The methodology suggested as most appropriate could be testing genetic material directly in the field under upland conditions, selecting plants having the least affected foliar area and discarding those showing infection on the panicle neck.

Cesar P. Martinez, National Coordinator for ICA's Rice Program, explains the evaluation of the rice blast nursery in infection beds at ICA's experimental center in Palmira.

Collaborative Research on Rice Blast in Latin America

Various aspects related to testing genetic material for resistance to rice blast, were discussed. The possibility of testing the material under field conditions and discarding tests in infection beds was discussed; however, the consensus was that, until the most adequate method for evaluating the material is known, infection beds must continue to be used to determine a material's reaction in the seedling stage. Those programs having the necessary facilities can plant the material under field conditions to evaluate reactions during the adult plant stage (infection on the neck of the panicle).

So that CIAT and IRRI can work more efficiently to solve the rice blast problem in Latin America, the national program technicians were requested to indicate the type of material which they would like to receive. With the exception of Bolivia, Chile, Paraguay and Surinam, the delegates expressed their interest in continuing to receive germplasm from the rice blast nursery and/or segregating and advanced material. Some of the delegates suggested that the rice blast nursery includes commercial varieties from the region and the differential varieties. The delegate from Brazil suggested the inclusion of early maturing material adapted to upland conditions. Table 20 shows the types of material requested for evaluation to rice blast and to isolate the resistant germplasm for use in crossing and promotion to yield trials.

Table 20. Germplasm requested in the Third IRTP Conference for Latin America for evaluation of its reaction to rice blast.

Countries 1/	Germplasm			
	Nurseries 2/		Segregating material 3/	Advanced material 3/
	VIPAL	IRBN		
Brazil	X	X		X
Colombia	X			
Costa Rica	X		X	
Cuba	X	X		X
Dominican Republic	X			
Ecuador	X	X	X	
El Salvador	X			
Honduras	X			
Guatemala	X			
Guyana	X		X	
Mexico	X	X		X
Nicaragua	X			
Panama	X	X		
Paraguay				X
Peru	X	X	X	
Uruguay	X			
Venezuela	X		X	

1/ Those countries in Latin America not included do not desire at the moment to receive material for evaluating reactions to rice blast.

2/ VIPAL = International Rice Blast Nursery for Latin America, to be dispatched by CIAT.
IRBN = International Rice Blast Nursery, to be dispatched by IRRI.

3/ Material to be dispatched by CIAT.

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