e of Agrochemicals in Rice Production Decreases in Colombia and Venezuela

During the past two years, rice growers in Colombia and Venezuela have substantially reduced the unnecessary use of pesticides on their crops. This translates into higher profit margins, less environmental pollution, and a product relatively free of toxic substances for consumers.

This reduction was prompted by two main factors: governmental policies, which are eliminating subsidies for agrochemicals, and a gradual adoption of an integrated pest management (IPM) system. The latter makes it possible for farmers to know when and how to apply pesticides rationally in order to prevent waste.

"Integrated pest management is not a new technology," explains Luis Sanint, senior economist at CIAT's Rice Program, "rather, it is a more adequate management of the various technological options available to the farmer."

Sanint further explains that integrated management tries to maintain pest populations at a level that is economically acceptable to the farmer, that is, at or below the "economic threshold". This is the level at which the cost of available control techniques and methods is lower than the losses that would be avoided with the use of such techniques or methods. "The farmer has to constantly monitor pest densities and their relation with the crop in

order to prevent the losses they cause when crossing the economic threshold," he adds.

Studying rice cropping in Colombia

A census of rice producers was carried out in Colombia in 1989 by the Colombian Agricultural Institute (ICA), the Rice Growers' Federation (FEDEARROZ), and CIAT. It provided precise information about this sector, as well as a better understanding of its needs and its dynamics. As a consequence, it was possible to determine the optimal size of a sample in order to study in depth the characteristics of producers.

In 1990, a questionnaire designed by the researchers for a better understanding of rice IPM management problems was tested during the second semester of the year. The aim was to find out the percentage of producers who know about integrated crop management (ICM) and IPM, and the number who were either practicing them or planning to do so. It also sought to identify the management practices used, and their degree of adoption or rejection among farmers. There was also a section for producers who have never heard of integrated management. The questionnaire was evaluated on two occasions: first, with a group of 12 farmers and, later, with another group of 25 farmers in the departments of Meta and Tolima, in Colombia. Eighty-five percent of these farmers had either small or medium-sized farms (from 3 to 50 hectares) and the rest had more than 50 hectares. Finally,

the adjusted questionnaire was distributed again in January 1991, to a sample of 170 farmers throughout Colombia.

Initial tests have indicated some tendencies that will probably be confirmed by the final survey. They are:

Rice farmers tend to apply management criteria that include at least one integrated management element, even though only 13.5% have heard about IPM.

An important portion of the sample indicated that agrochemical applications are being reduced, particularly those of insecticides and fungicides. Thus, in 1990, in Tolima department, the initial surveys show a reduction of 70% in the total volume of insecticides applied, compared with the 1980s average; the number of applications seems to have dropped by almost one-third, and almost 30% of farmers are not applying pesticides at all (Table 1).

A similar reduction in use may be taking place with fungicides. So far, preliminary surveys show that the total volume of fungicides being applied has dropped to about one-half, the number of applications to about one-fifth, and the percentage of farmers not applying has risen from 22.7% in the 1980s to 42.8% in the 1990s.

Herbicide use continues to be constant, as it is linked to agronomic aspects such as soil preparation, quantity and quality of seed, water management, and soil leveling, all of which still show complex inefficiencies.

The increased efficiency in the use of technological components can be observed with respect to seed density: it

dropped from an average of 266 kg/ha during the 1980s to 225 kg/ha during the 1990s. Also, the amount of nitrogen fertilizer dropped from 205 kg/ha in the 1980s to about 180 kg/ha in the 1990s.

An increasing percentage of farmers are using technically defined action thresholds (parameters that indicate when to start using agrochemicals), whereas the rest are using empirical thresholds. Insects as leafminers and leafhoppers are controlled in about 85% of cases by managing water levels. The same practice is used by most farmers to control rice blast disease. Others control it through the combination of such elements as planting dates and improved varieties.

These tendencies reflect, to a large extent, FEDEARROZ and ICA's efforts to encourage rice growers to adopt management techniques that would optimize their use of inputs. It is obvious that rice growers are interested, as are all farmers, in reducing their production costs.

The Venezuelan case

Since 1988, researchers from the Western Plains Association of Certified Seed Producers (APROSCELLO) and the Foundation for the Development of the Central-West Region (FUDECO), in collaboration with CIAT's Rice Program, have been doing surveys in the Portuguesa state, one of the two most important rice-producing areas of Venezuela.

Preliminary survey results indicate that Venezuelan rice growers are substantially reducing agrochemical applications, particularly after the dramatic price increases that followed the government's elimination of subsidies.

The figures are telling: during the first semester of 1988, all producers were applying some level of insecticides, whereas during the second semester of 1989, 40% did not apply at all. For fungicides, during the first semester of 1988, all rice growers were applying them, whereas during the second semester of 1989, 94.2% were not applying at all; there was not a single case of more than four applications per cropping cycle (Table 2).

IPM, one of the incentives

"It is very difficult to directly credit research and extension for the drop in the use of pesticides and the rationalization of their use," concludes Sanint, "as during the last decade, economic conditions have forced governments to reduce their subsidies to agrochemicals, and farmers themselves have had to tighten their belts. But one thing is certain: if there were no evidence that it is possible to reduce the use of inputs without sacrificing yields, it would have been very difficult for farmers to adopt certain input-saving practices."

These types of surveys, administered in a continuous fashion, are used for monitoring the impact of technology

among producers. This results in very useful information for researchers because it provides tools for designing technological options that are more adequate to farmers' needs. In particular, preliminary survey results on the use of agrochemicals in Colombia and Venezuela seem to indicate that integrated pest management has ample possibilities for improving rice growers' incomes and the quality of the environment and of their products. Research on this subject will continue to have high priority for national and international institutions.

Table 1. Evolution in rice management practices. Tolima, Colombia, 1980-1990.

Cropping practices	1980 (n=44)	1990 (n=21)
Seed density (kg/ha)	266	225
Nitrogen (kg/ha)	205	181
Herbicide:		
a.i., kg/ha	5.5	5.3
No. of applications/ha	3.1	3.3
Farms with no applications (%)	0	0
Insecticide:		
a.i., kg/ha	4.2	1.2
No. of applications/ha	4.0	1.5
Farms with no applications (%)	0	28.6
Fungicide:		
a.i., kg/ha	3.6	1.6
No. of applications/ha	5.0	1.05
Farms with no applications (%)	22.7	42.8

*. a.i. = active ingredient.

SOURCES: 1980: Ramirez (1986); 1990: CIAT Rice Program.

Table 2. Percentage of farmers by number of agrochemical applications and by crop cycle, Venezuela.

Applications (no.)	1988 A	1988 B	1989 A	1989 B
	Herbicides (%)			
0	0.0	0.0	0.0	1.9
1	88.2	97.3	92.7	84.6
2	11.8	1.4	7.2	11.5
3	0.0	1.4	0.0	1.9
>4	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0
	Insecticides (%)			
0	0.0	36.0	5.7	40.4
1	11.6	25.3	30.0	28.8
2	23.2	29.3	22.9	25.0
3	40.6	9.3	18.6	5.8
>4	24.6	0.0	22.9	0.0
Total	100.0	100.0	100.0	100.0
	Fungicides (%)			
0	1.4	44.0	70.0	94.2
1	37.7	40.0	21.4	3.8
2	33.3	12.0	1.4	0.0
3	23.2	2.7	7.1	1.9
>4	4.3	1.3	0.0	0.0
Total	100.0	100.0	100.0	100.0