THE PRACTICE OF RATOONING IN DOMINICAN REPUBLIC [1/]

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ABSTRACT

Rice ratooning is a common means to obtain a second rice crop in Dominican Republic. During the second semester of 1981, 12,000 has were ratooned while only an estimated 10,000 has were double cropped. Farmers manage the ratoon crop by recutting the stubble at a height of 10 cm and begining applying water flushings two weeks later, until the regrowth withstands flooding. Two to three fertilizer applications are done, usually following hand weedings. An average of 91 kg N, 22 kg P_2O_5 and 1.6 kg K_2O per hectare are used. Ratoon crop yields during the second semester of 1985 averaged 3.0 t/ha in Jicomé and Castañuelas, locations where ratooning is the first option for the second semester. The rice crop planted during the same period averaged 3.9 t/ha. The cost of production per ton under ratooning was significantly lower in both locations, US$94.40 vs US$247.90 in Jicomé and US$113.70 vs US$163.10 in Castañuelas. The yield per unit of time of the ratoon crop was not different than the planted crop in Jicomé (about 30 kg/ha/day), while it was lower in Castañuelas (25 vs 33 kg/ha/day). Economic as well as logistical reasons partly explain the popularity of rice ratooning.

1/ *Part of this work was conducted while the author was with the Instituto Superior de Agricultura, Santiago, Dominican Rep.*

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THE PRACTICE OF RICE RATOONING IN DOMINICAN REPUBLIC

INTRODUCTION

With an area varying from 100 to 120 thousand hectares per year, rice occupies the fourth place in land area harvested among crops planted in the Dominican Republic. Since the crops with larger harvested areas are for export, i.e. sugarcane, coffee and cacao, rice represents the major locally produced food crop for the Dominican people. Additionally, since most rice is planted under irrigated lowland conditions, it is second only to sugarcane in the use of irrigated flat lands.

The general goal of Dominican agricultural authorities is to obtain two crops of rice per year, which is a feasible target considering climatic conditions. In order to double crop, the first crop should be established before the middle of February, either transplanted or direct seeded, and harvested before the end of June (Figure 1). The general recommendation is to plant the second crop before the end of August to escape low night temperatures (below 20°C) and cool winds during flowering, which usually begin in early December, and to avoid overlaping the following year's first crop. The first crop is referred to as spring crop and the second as winter crop.

Lack of credit, machinery and water deficits, among other reasons, prevent farmers from following the double-crop system every year. For example, in 1981 the total physical area used to grow rice at any moment was 90 thousand hectares, whereas the total harvested area

amounted to 112 thousand, which indicates a cropping intensity of 1.24 (2)

Thus, double cropping is more the exception than the rule. This is not often realized since data on harvested area from spring and winter crops for 1981 were 61.7 and 50.3 thousand hectares respectively, which could give the impression of a cropping intensity of 1.8. However, some of the area planted during the second semester was not planted in the previous semester, and viceversa.

Due to the difficulties associated with double cropping, Dominican farmers have traditionally obtained a ratoon crop, which reduces the need for machinery for land preparation and the time required to harvest a second crop by taking advantage of the regrowth from first-crop stubble (Figure 2).

This paper describes the practice of ratooning in the Dominican Republic and compares its profitability with a second planted crop. To do that, the literature on ratooning in the Dominican Republic is reviewed and the results of a survey conducted during the second semester of 1985 in two locations, where ratooning is prefered over a second planted crop, are summarized.

RATOONING AS A SECOND CROP

As indicated above, 50.3 thousand hectares were harvested as the second crop of 1981, 12.1 thousand hectares of which came from the ratoon crop.

Ratooning was about one fourth of the area harvested during the second half of that year. However, if the area ratooned is substracted from the total of 112 thousand hectares harvested during the year, a more striking picture would arise. Thus, the harvested area is reduced to 100 thousand hectares. Considering a total physical area of 90 thousand hectares, the actual area double cropped was 10,000 hectares. Therefore, ratooning and planting were equally popular during the second semester of 1981.

The ratoon crop in the Dominican Republic is usually managed as a crop, to maximize productivity, and not left in the field to harvest whatever rice is produced. The farmers are so aware of the importance of managing the ratoon crop that they use a different name when no cropping husbandry is used. When rice is harvested and the stubble is left in the field without recutting or applying any inputs, to harvest whatever is produced, the crop is called "riso". This differs from "retoño" (ratoon) which requires a second cutting and careful management after harvest (5).

The "riso" system is usually practiced by farmers growing a photoperiod sensitive cultivar, which they think would not yield a second crop if the stubble were recut after harvesting. They seem to be aware that lower buds have not been affected by photoperiodic cycles with the same intensity as the higher buds. Farmers are content with whatever rice they harvest, which usually takes about 60 days.

The first activity of the ratoon crop is to recut the stubble as soon as possible after harvest. Cutting heights vary within and among locations. A survey conducted during the second semester of 1985 in two locations of the country showed that in Jicomé, 14 out of 16 farmers cut the stubble at 10 cm or lower whereas in Castañuelas variability in cutting height was greater, in some cases as high as 17.5 cm (lable 1). In general, more than half of the farmers surveyed used cutting heights of 10 cm or less.

After recutting, the stubble is allowed to regrow for two weeks, after which the first irrigation and fertilization are done (Figures 3 and 4). Water flushed until the regrowth is able to withstand flooding. The first fertilizer application usually involves a complete formula, or with N and P. About a month later, hand weeding is done and additional fertilizer is applied, usually only nitrogen in the form of urea or amonium sulphate.

A second handweeding is usually done right before flowering, about 65 days after cutting, after which pesticides (mainly insecticides against stink bugs, Oebalus spp.), are also applied. Eight out of 14 farms surveyed in Jicomé made a third fertilizer application at this stage. Total fertilizer applications in the ratoon crop of 1985 in Jicomé and Castañuelas averaged 91 kg N, 22 kg P_2O_5 and 1.5 kg K_2O/ha (Table 2). The amount of potasium was low probably because it was not intended to be applied and was only a result of the use of complete formulas for the first application. The fertilization of the planted crop is also

shown in Table 2. Farmers applied 81 percent as much nitrogen to the ratoon as it was applied to the second planted crop.

Harvest occurs about 100-110 days after cutting. During 1985 the ratoon crop was harvested before the month of December in both locations, which making it possible to plant on time the spring crop in the following year.

RATOON VS PLANTED CROP

Several authors have tried to compare ratoon vs planted crop, usually by relating ratoon yields and growth duration with those of "main crop". A recent review showed that ratoon yields varied from 0 to 140 percent of the main crop, and days to maturity from 31 to 102 percent (1). We consider that, although the relation with the main crop data is interesting, a more valuable comparison is the ratoon with the second crop, since they represent mutually exclusive alternatives for the farmer, and take advantage of similar environmental conditions.

The analyses done by Cuevas-Pérez and Núñez-Jiménez (1981), De Groot (1983) and Doorman and Cuevas-Pérez (1985) discussed the costs of ratoon and "second rice crop" in the Dominican Republic. Cuevas-Pérez and Núñez-Jiménez (1981) used data from cost of production surveys to compare yields, costs of production and efficiency (yields per area per time) of ratoon vs the main crop. They pointed out that ratoon yields varied from 61 to 80 percent of main crop, cost per kilo of paddy from 36 to 71 percent of main crop and efficiency from 95 to 120 percent.

Thus, although ratoon yields were lower, the crop was produced in less time and was always cheaper. In the same paper, the authors used data from a single farm which double cropped and ratooned in consecutive years. They showed that the ratoon crop was cheaper than the second crop, although with lower yields and efficiency. The ratoon produced rice at a cost of US$0.10 per kilo, while it cost US$0.19 to produce a kilo with the planted crop. The second crop yielded 82 percent of the main crop during the first year, whereas the ratoon yield was 60 percent in the second year. The efficiency of the planted crop was 28 kg/ha/day, and the ratoon crop only 26 kg in the same area using the same amount of time.

De Groot (1983) made similar comparisons using data from the ratoon crop of two rice farms, and by estimating second crop yields. He concluded that additional rice produced by a second planted crop would exceed the farm price of paddy. Doorman and Cuevas-Pérez (1985) used data from 184 farms for the first crop and 36 farms for ratooning to compare the profitability of the ratoon crop with that of a second planted crop. By estimating second planted crop yields as 90 percent of first crop, they observed that benefits from ratooning would be US$598.00, whereas second crop would produce US$408.

In 1985, we studied second and ratoon crop growing at the same time in two locations of the country where ratooning is a common practice. In Jicomé, 18 farmers were studied throughout the crop, 16 under ratoonig and two under planted second crop, with respective total areas of 400 and 150 hectares (Table 3). The farms in Castañuelas were

smaller: but the total area studied under ratooning was 400 ha while the second crop area was only 20 hectares.

It was observed that in Jicomé, ratoon yields were 92 percent of second planted crop yields (3.5 vs 3.8 t/ha), whereas in Castañuelas the ratoon crop only yielded 52 percent (2.5 vs 4.7 t/ha) (Table 4). Thus, even in those areas where ratooning is more popular than replanting, its yields were lower. The reasons for prefering ratooning are thus associated with factors other than production.

Considering that production costs are very farm specific and that they are usually related to yields, we compared costs of production taking into account variability among farms. Through analysis of variance, we obtained estimates of the variance associated with production costs per hectare and per ton of paddy.

Variable costs of production per hectare showed a similar behavior across locations, ratoon crop costs being one third of those of the planted crop (US$294.7 vs US$811.3) (Table 5). Total costs in Jicomé tended to be higher than those in Castañuelas. However, when individual farm yields were considered and analysis was done in terms of costs per ton of paddy, a different picture arose. Costs per ton in Jicomé were much lower for the ratoon crop (US$94.40) than for the planted crop (US$247.90) (Table 6). The same was observed in Castañuelas, although the cost advantage of the rice produced under the ratoon cropping system

was not as big (US$113.70 vs US$163.10). This was expected since ratoon yields in Castañuelas were only half of the planted crop, whereas in Jicomé the ratoon yielded an average of 92 percent.

The minimum fixed price per ton of paddy rice for the second semester of 1985 was US$230.00, which was lower than the cost to produce a ton under the planted crop in Jicomé. Obviously better yields would have reduced the gap between the rice produced under the two cropping systems.

Agronomists tend to compare cropping systems estimating the quantity of product obtained per unit of time. This comparison takes the crop cycle into account when yields are compared. Table 7 summarizes the production efficiency of the ratoon and the second planted crop in the two locations of Dominican Republic studied. In Jicomé both crops produced around 30 kg of paddy per hectare per day, with no detected difference, whereas the planted crop produced significantly more rice per day than the ratoon crop in Castañuelas.

GENERAL DISCUSSION

There seem to be two types of farmers practicing the ratoon crop in the Dominican Republic: one that obtains a ratoon crop in years when a second planting is difficult, mainly due to time constraints; and another that ratoons every year. The analysis presented by Cuevas-Pérez and Núñez-Jiménez (1981) with a farm which ratooned one year after planting a second crop the previous year, and the "riso" cropping system

described by Doorman and Cuevas-Pérez (1984) seem to represent the first type.

The farmers that ratoon every year are common in the sample taken in the two locations used in this paper to describe ratooning. For example, there doesn't seem be any time constraint for the farmers of Jicomé to plant a second crop since they finished their first crop in early June. The case of Castañuelas is quite different since the first crop is often harvested late, which makes it difficult for farmers to harvest a second crop before the end of the year. In fact, several farmers double cropped during the second semester of 1985 (not included in the study) and wouldn't harvest until the end of January 1986. This would probably reduce their yields because of lower temperatures during December and early January. The time constraint in Castañuelas seem to be common, since most farmers indicated that ratooning is their choice for the second crop every year.

The reasoning behind the farmers in Jicomé seems to be economical; they cannot make money with a second planted crop, but can produce ratoon rice cheaply at a good profit. Although farmers in Castañuelas produce rice cheaper under ratooning, their total profit under the planted crop is greater. For example, they would earn a net profit of US$116.3 per ton of paddy, that with a yield of 2.5 tons would give a total profit of US$290,75. In the case of the planted crop the net profit per ton would be US$66.90, and at a yield of 4.7 tons the total profit would be US$314.43. The question is whether it is worthwhile to make an additional investment of US$473.40 (US$754.6 - US$281.20) to grow a second planted crop to obtain a profit of US$23.68.

We doubt that farmers decisions are taken by analyzing numbers in that way, especially the small farmers of Castañuelas. A more reasonable explanation for ratooning in Castañuelas, in addition to the time constraint, would be the scarcity of money. In our calculations of production costs, we observed that interest charges in Castañuelas were much higher than those in Jicomé. In the case of farmers obtaining a ratoon crop, interest charges in Jicomé were half of those in Castañuelas, while in the case of a planted double crop the value was about one eighth. Thus, money seem to be more expensive in Catañuelas, and charges during the planted crop increased due to the fact that money had to be kept longer.

Table 1. Number of Farmers Practicing Different Cutting Heights for Ratooning in Two Locations of the Dominican Republic, 1985.

Cutting Height (cm)	Location		Total	%
	Jicomé	Castañuelas		
7.5	7	4	11	22
10.0	7	11	18	36
12.5	1	8	9	18
15.0	1	9	10	20
17.5	0	2	2	4
Total	16	34	50	100

Table 2. Fertilizer Applied (kg/ha) to the Ratoon and Second Planted Crop in Two Locations of the Dominican Republic, 1985. [1/]

Fertilizer [2/]	Location		Mean [3/]
	Jicomé	Castañuelas	
	Ratooned First Crop		
N	88.4	93.9	91.1
P_2O_5	30.1	13.4	21.7
K_2O	2.1	1.1	1.6
	Second Planted Crop		
N	106.7	156.5	112.5
P_2O_5	97.0	7.8	86.5
K_2O	0	3.4	0.4

1/ *Based on a survey of 400 hectares of ratoon crop in each location, and 15 hectares in Jicomé and 20 hectares in Castañuelas of Second Planted Crop.*

2/ *Formulas used included 15-15-15, 16-20-0 and 12-24-12. Both urea and ammonium sulphate were also used.*

3/ *Weighted according to area in each location.*

Table 3. Characteristics of the Ratoon and Second Planted Crop Farms Studied in Two Locations of the Dominican Republic, 1985.

System	Location		Total
	Jicomé	Castañuelas	
Ratoon			
Farms (number)	16	42	58
Area (has)	400	400	800
Variety [1/]	Mingolo	Mingolo	-
Second Planted Crop			
Farms (number)	2	5	7
Area (has)	150	20	170
Varieties [2/]	ISA-21	ISA-21	-
		ISA-40	-

1/ Mingolo is a traditional tall variety.

2/ ISA-21 and ISA-40 are improved semidwarfs.

Table 4. Yield (t/ha) of Paddy Rice Under Two Cropping Systems in Two Locations of the Dominican Republic. 1985

System	Location		Mean [1/]
	Jicomé	Castañuelas	
Ratoon Crop	3.5	2.5	3.0
Planted Second Crop	3.8	4.7	3.9

[1/] Weighted according to area in each location. There were 400 hectares for the ratoon crop in each location and 150 and 20 hectares for the planted second crop in Jicomé and Castañuelas, respectively

Table 5. Cost of Production (US$/ha) of Two Cropping Systems in Two Locations in Dominican Republic, 1985.

System	Location		Mean [1/]
	Jicomé	Castañuelas	
Ratoon Crop	330.2	281.2	294.7
Planted Second Crop	952.9	754.6	811.3
DMS 0.5	_	_	142.9

[1/] Weighted using number of farmers per cropping system: There were 16 and 2 farmers for ratoon and second crop respectively in Jicomé. The respective number for Castañuelas were 42 and 5.

Table 6. Cost (US$) per Ton of Paddy Produced under two Cropping Systems in Two Locations in the Dominican Republic, 1985.

System	Location	
	Jicomé	Castañuelas
Ratoon Crop	94.4	113.7
Second Planted Crop	247.9	163.1
DMS 0.5	64.5	20.8

Table 7. Production Efficiency (Kg/ha/day) of Ratoon and Planted Crops in Two Locations of Dominican Republic, 1985.

System	Location	
	Jicomé	Castañuelas
Ratoon Crop	30.8	24.5
Second Planted Crop	27.8	32.8
DMS 0.5	10.1	1.6

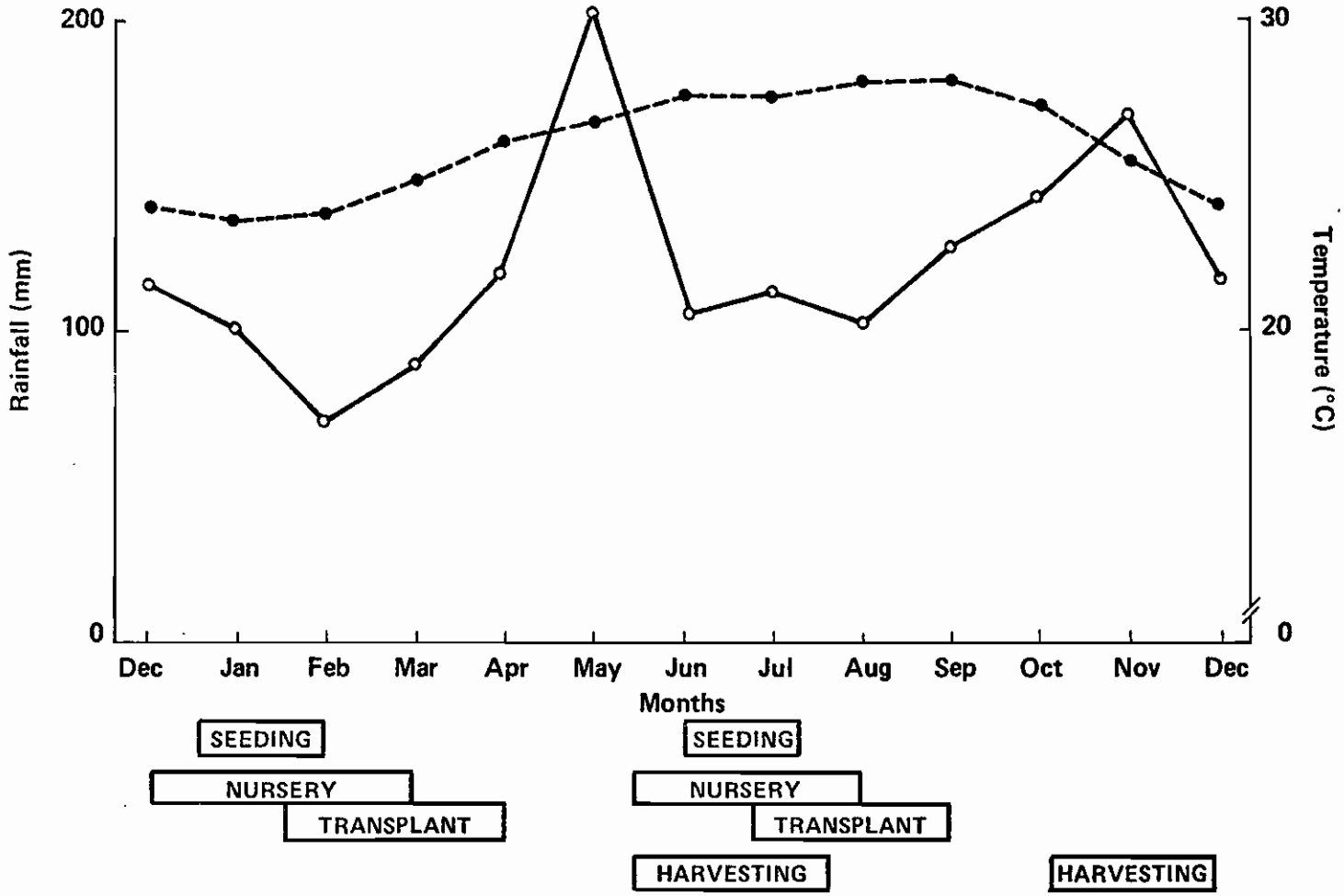

Fig. 1. Double cropping of rice in the Dominican Republic. (Vargas Medina y Cuevas-Pérez, 1984).

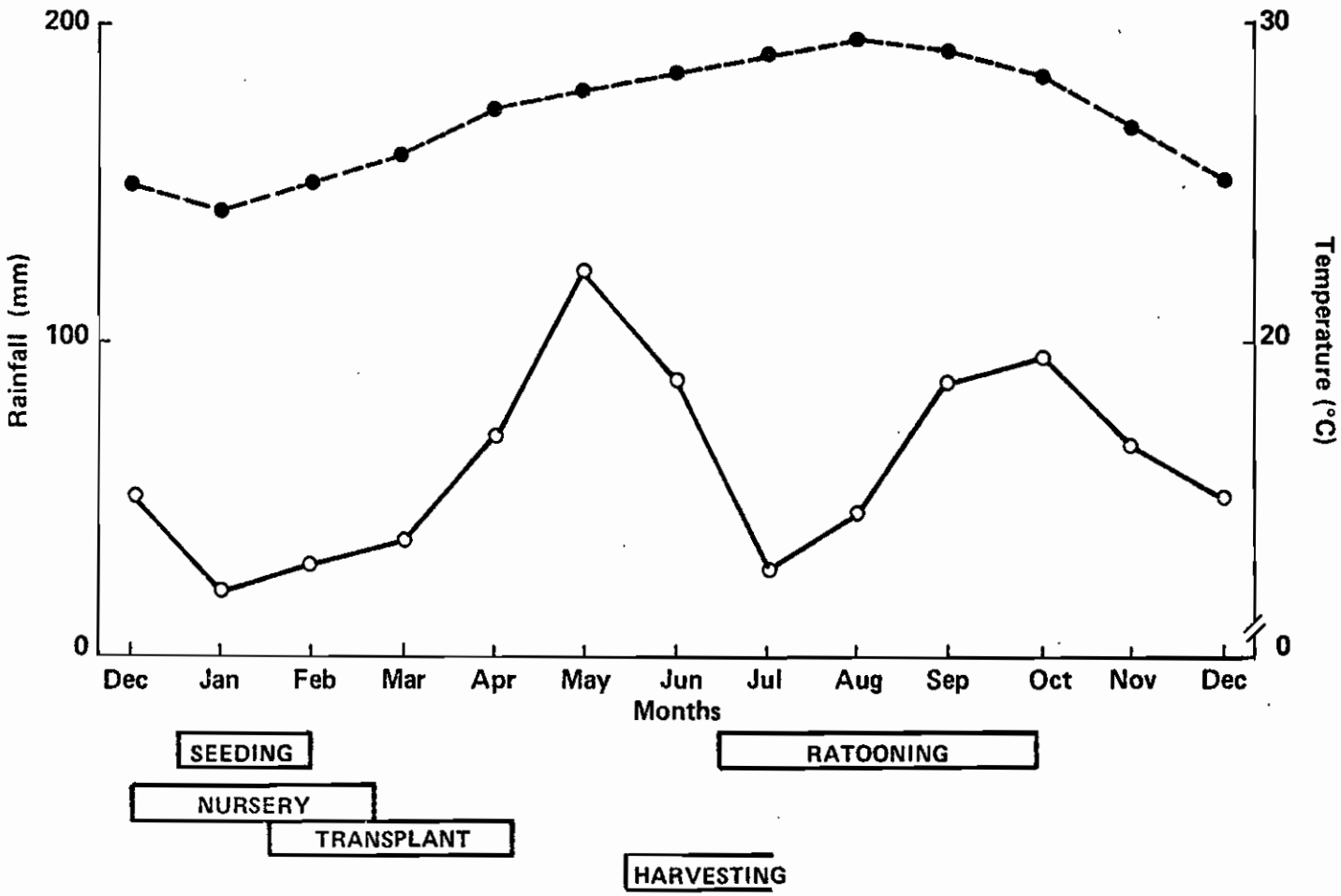

Fig. 2. The spring crop and the ratoon of rice in the Dominican Republic. (Vargas Medina y Cuevas-Pérez, 1984).

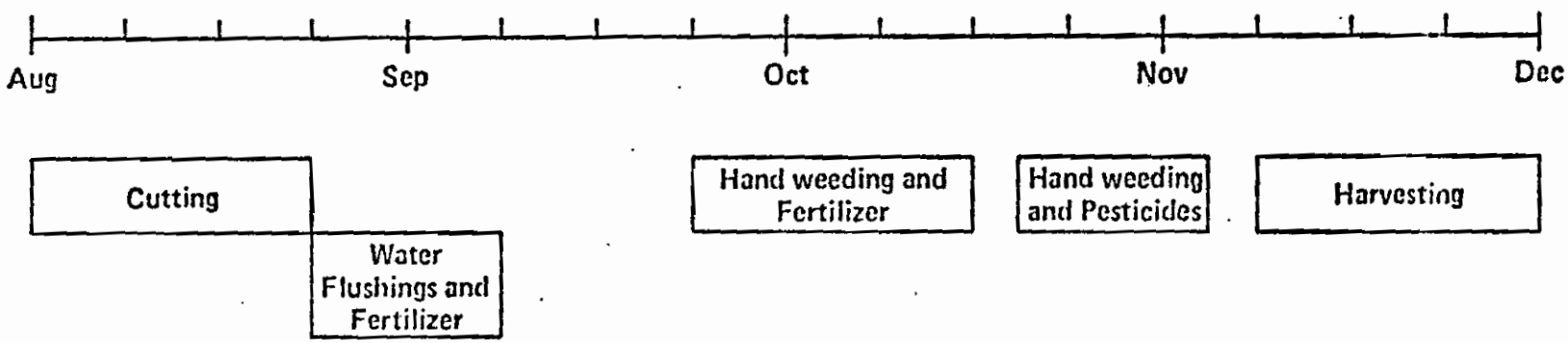

Figure 3. Rice ratooning crop sequence in Castañuelas, Dominican Republic, 1985

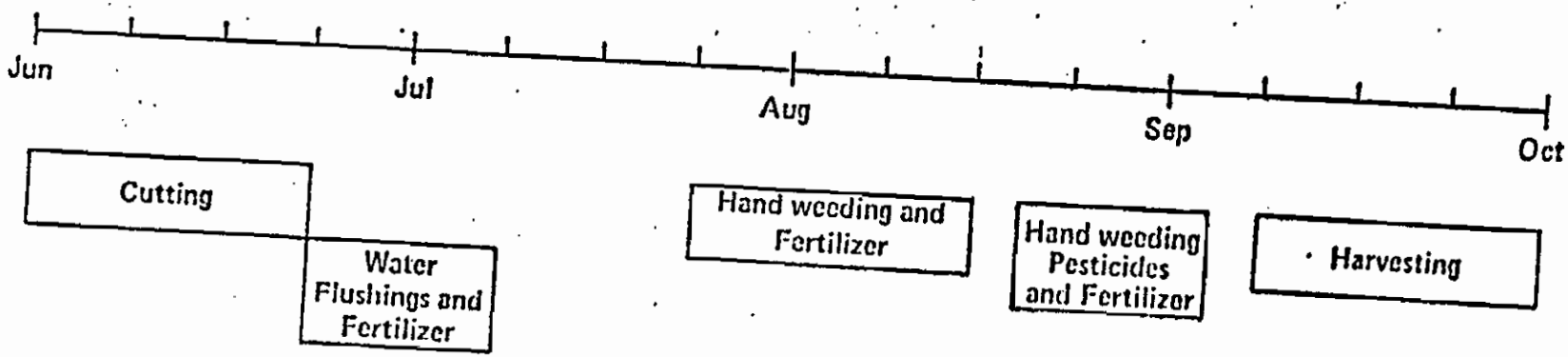

Figure 4. Rice ratooning crop sequence in Jicomé, Dominican Republic, 1985

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