RED RICE INTERFERENCE

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Assessing of levels of weed infestation allows for the prediction of rice yield losses. Knowledge of such potential losses improves weed management decision making, cost of control, and may allow to reduce herbicide inputs.

Red rice is a menace in rice areas of Latin America and the Caribbean. Yield responses to red rice density have been obtained for different situations (Figure 1). Results differed across environments due to changes in, varieties, red rice ecotypes, and growing conditions among other factors. The Jamundi curve corresponds to Oryzica 1 growing under intermittent irrigation; in Limón del Yuna (Dominican Republic)[1/], CICA 8 grew under flood irrigation in puddled soil. The Tolima and Brazil curves were derived for irrigated rice (Pulver, 1988). Figure 3 shows the effect of crop density on red rice competition (Pulver, 1988).

1/ Study conducted in cooperation with Drs. Armenta and Coulombe at CRIN, Dominican Republic.

Thus, under different growing conditions, a range of yield losses can result from a given red rice infestation. Red rice effects on rice yields, therefore, appear to be quite site specific. However, when growing conditions are comparable, competition results can be very similar for regions as distant as Cali and Arkansas (Figure 3). Better knowledge on the effects that most relevant biotic and abiotic agroecosystem components have on weed density-yield relationships may allow for more generalizations from this type of information. Quantification of such interactions could be fed to a competition model and predictions over broader ranges of situations could be sought.

When levels of weed infestation and potential yield losses can be established early, then weed management decisions can be taken for the ongoing season. It is, therefore, more useful to establish red rice infestation levels in terms of red rice plants/m^2 (Figure 4), counted 20-30 days after emergence, rather than in panicles/m^2 (Figures 1 and 2). Figure 4a corresponds to a crop seeded in dry soil and grown under intermittent irrigation, while the crop in Figure 4b was seeded as pregerminated seed into puddled soil and grew under flood irrigation. The rice varieties used in both cases have good tillering capacity, and ISA 40 (Figure 4b) has longer leaves and leaf area than Oryzica 1 (Figure 4a). Conditions were more suppressive of red rice growth in Limón del Yuna. Pregerminated rice has a growth advantage over red rice seedlings, and is, therefore, better suited to compete with this weed, while rice seeded in dry soil tends to emerge together with red rice, thus facing more severe initial competition by this weed. Rice seeding rate in Figure 4b was 130 kg/ha vs 100 kg/ha for Figure 4a. Figure 4a shows that, in spite of red rice seed shatter, farmers with heavy infestations can harvest considerable amounts of red rice seed. This seed is a source for reinfestations and will lower the final price of the rice harvest. The red rice ecotype in Limón del Yuna shattered most of its seed before final rice harvest, avoiding seed removal with the rice harvest, thus ensuring reinfestation with this weed. Weed density vs yield information is useful for use with weed management decision support systems to make economic decisions about weed control.

An experiment in Jamundí, Colombia, showed the effect of removing red rice from a crop at progressively later dates (Figure 5). In this case, the gradual yield decline would allow for flexibility in timing weed control. Control alternatives (preemergent, postemergence hand pulling or wiping with a herbicide-embedded wick, etc.) can be selected according to cost/expected benefit ratios.

Studies to predict crop losses by red rice competition can provide powerful economic reasons justifying crop rotations at high levels of red rice infestations.

Figure 1.

RED RICE: DENSITY X ENVIRONMENT

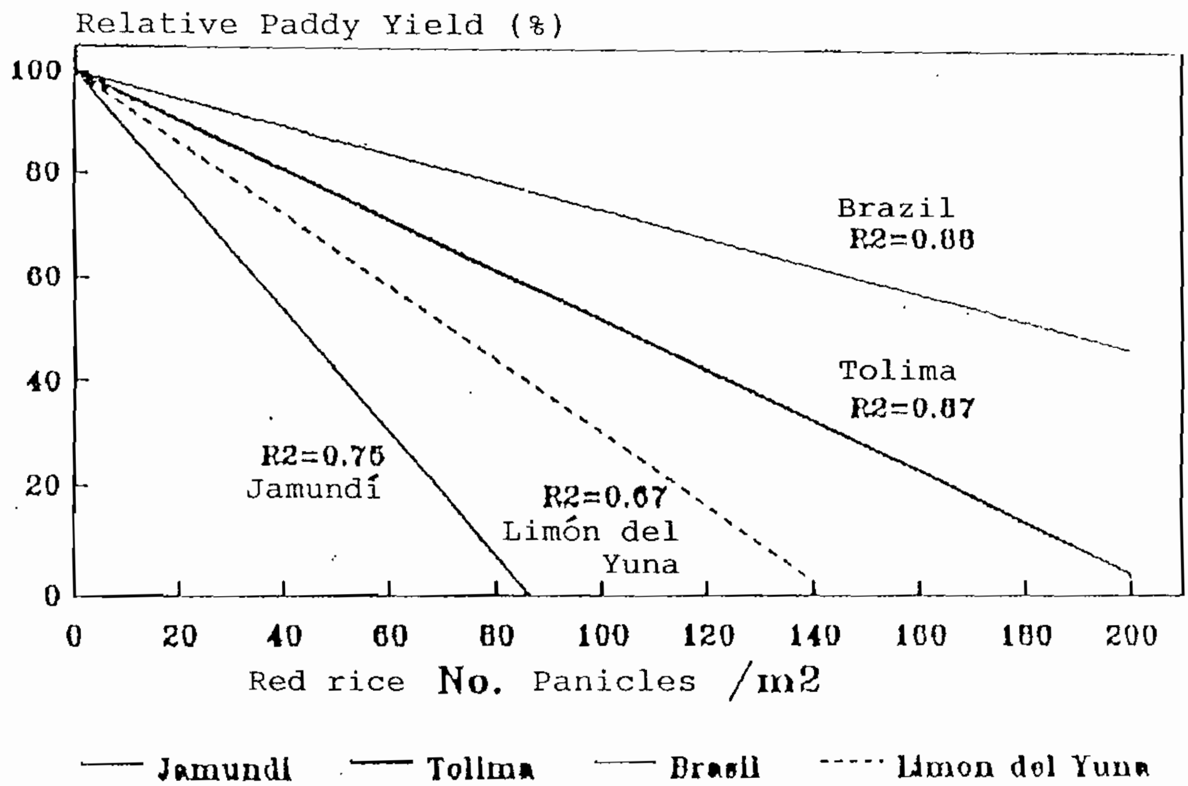


Figure 2.

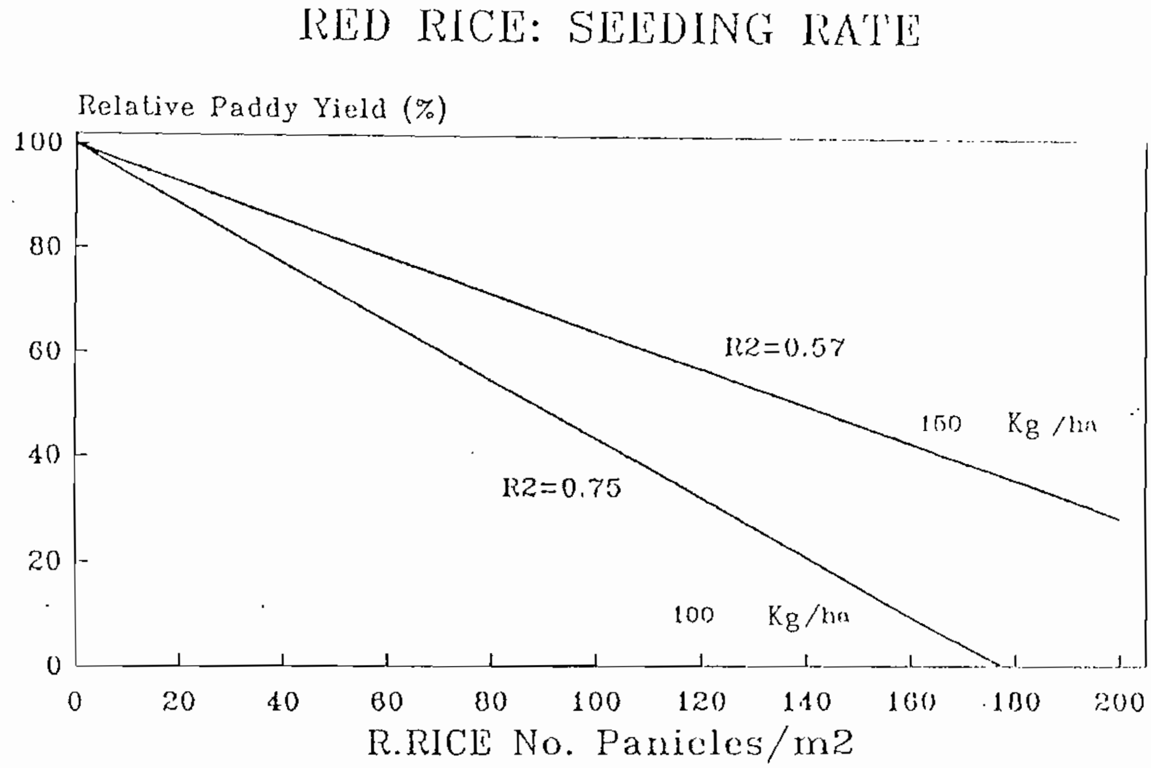

RED RICE: SEEDING RATE
Relative Paddy Yield (%)
100
80
60
40
20
0
R2=0.57
150 Kg /ha
R2=0.75
100 Kg/ha
0
20
40
60
80
100
120
140
160
180
200
R.RICE No. Panicles/m2

Figure 3.

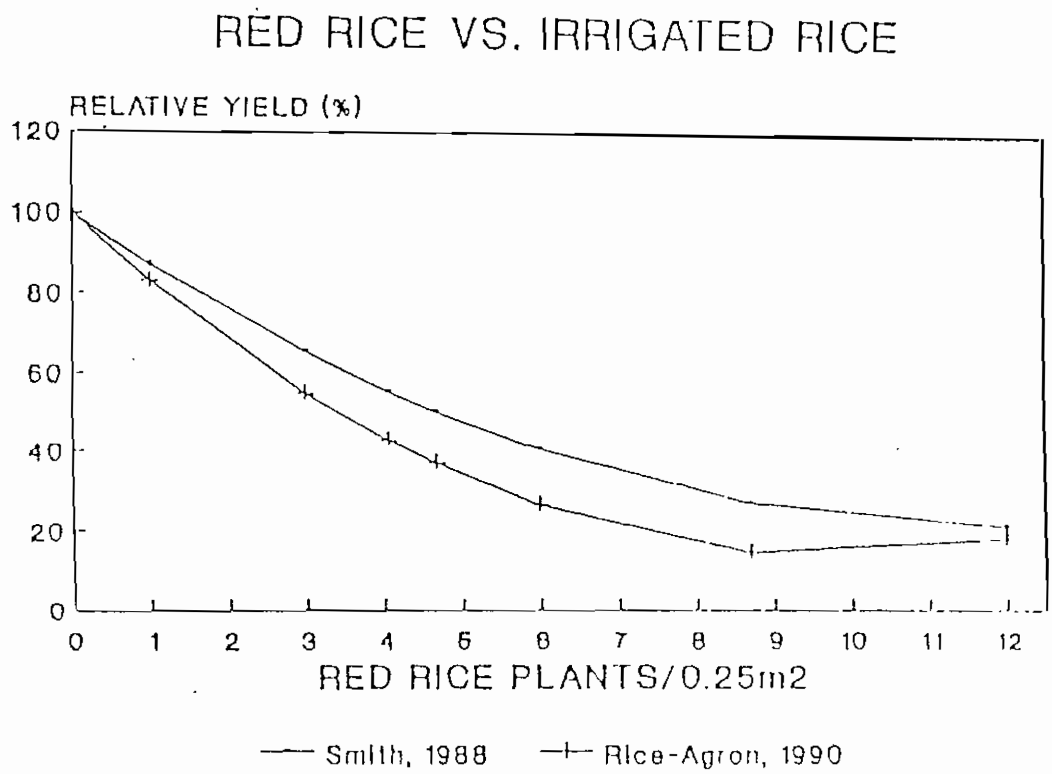
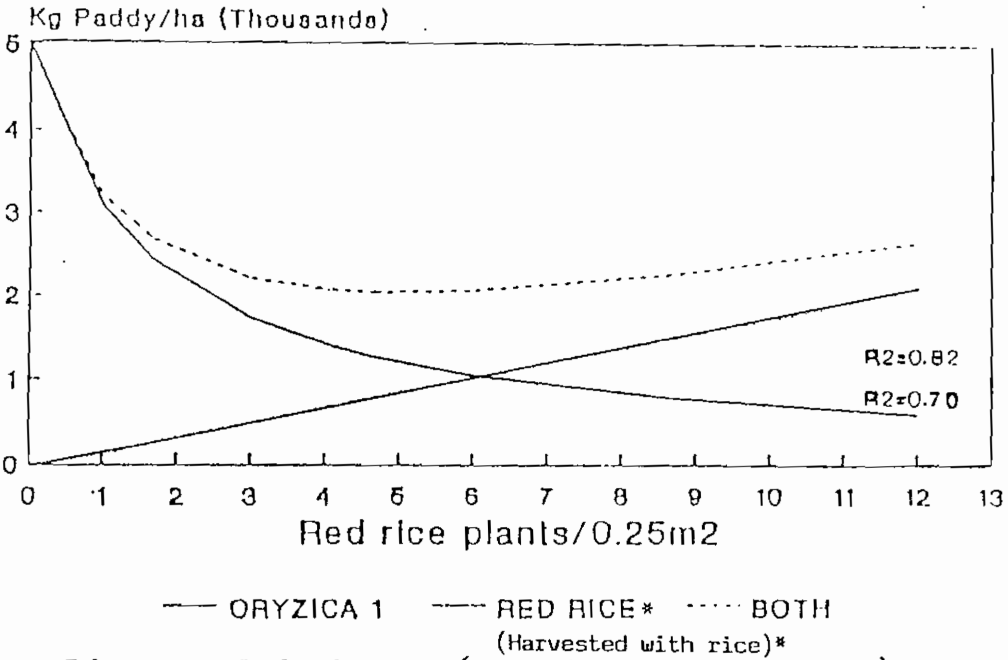

RED RICE VS. IRRIGATED RICE
RELATIVE YIELD (%)
120
100
80
60
40
20
0
0
1
2
3
4
5
6
7
8
9
10
11
12
RED RICE PLANTS/0.25m2
Smith, 1988
Rice-Agron, 1990

Figure 4.

a) LEVELS OF RED RICE INFESTATION
Jamundi, 1990



b) Limon del Yuna (CRIN cooperation),1990

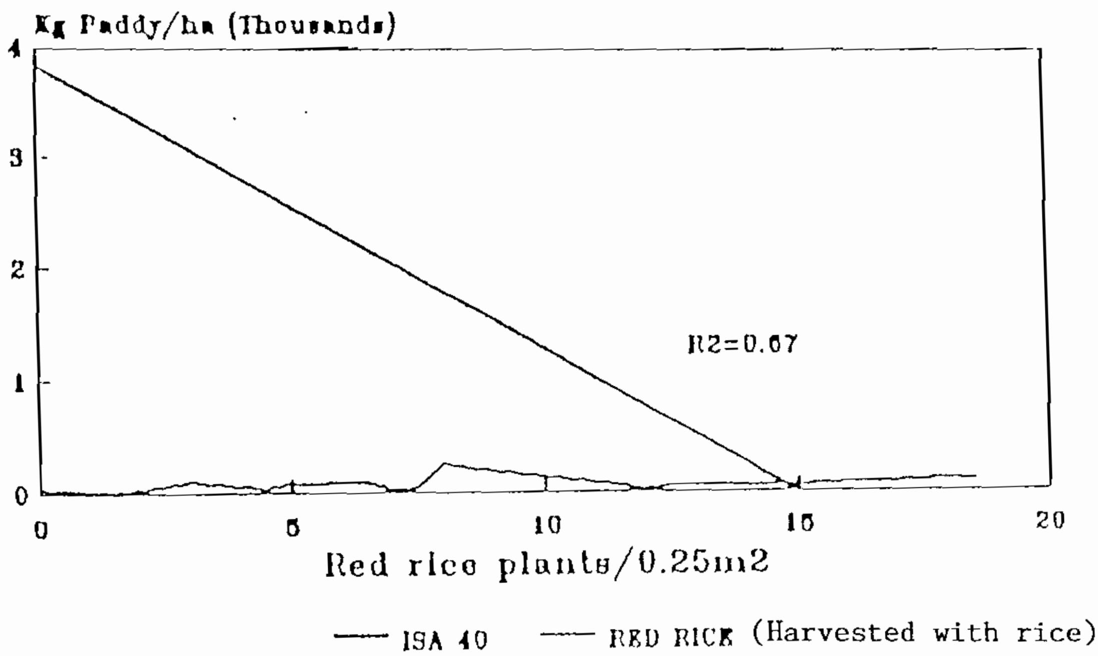
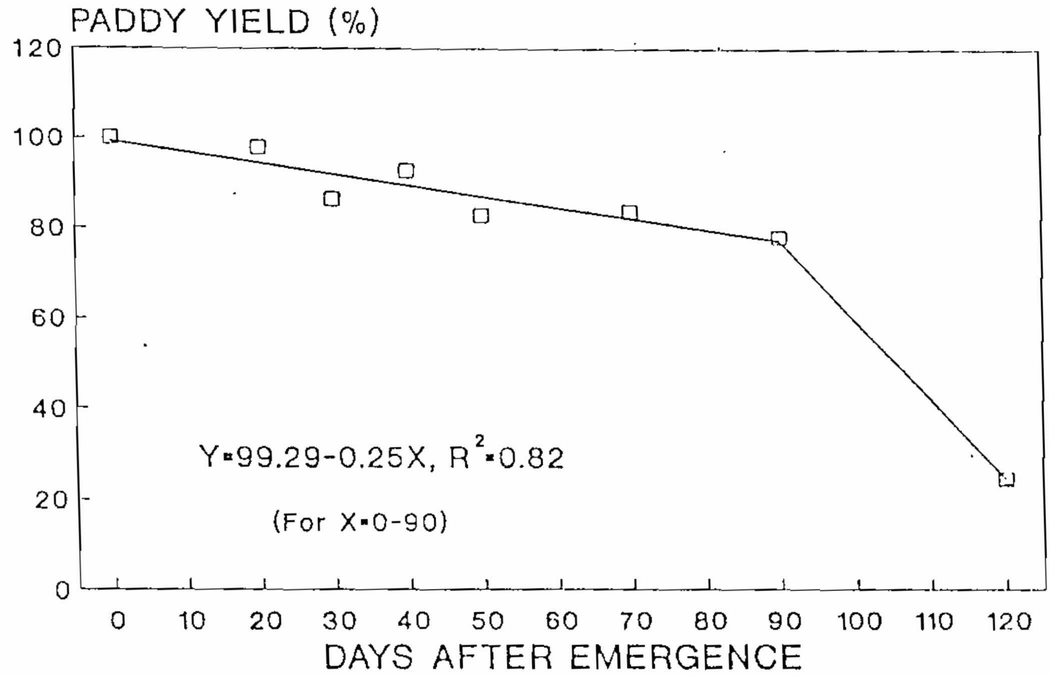


Figure 5.



Effect of length of red rice competition after emergence on rice yields.