

Planting Dates in Relation to Weather Pattern at Manaus, Brazil

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Research on upland annual cropping systems at the UEPAE/Manaus station has been primarily directed toward a corn-cowpea rotation. On-site studies with other crops, and related work at Yurimaguas, Peru, have demonstrated the feasibility of additional crops for this ecosystem. However, differences in rainfall between Manaus and Yurimaguas have suggested that the optimum planting dates derived for the Peruvian Amazon would not be applicable to the conditions in Manaus (Figure 1).

This study was initiated in June, 1982, in order to establish optimum planting dates for corn, cowpeas, rice and soybeans in the Manaus region. These crops were planted at three-week intervals in a randomized complete block design with seven planting dates and three replications. Plots for corn and rice were alternated with cowpeas and soybeans, respectively, in plantings succeeding the seventh date, in an attempt to minimize the buildup of soil-borne pests and diseases.

Yields and Planting Dates

Crop yields as a function of planting dates from 1982-1985 are shown in Figures 2 and 3. Year-to-year changes in yield patterns were influenced by variability in annual rainfall distribution. Rainfall distribution approached the average pattern for ten years in 1984. In 1982, rainfall was unusually high in January, but below normal for July and September. For January-February, 1983, rainfall was below normal.

Maximum yields for all crops occurred during the

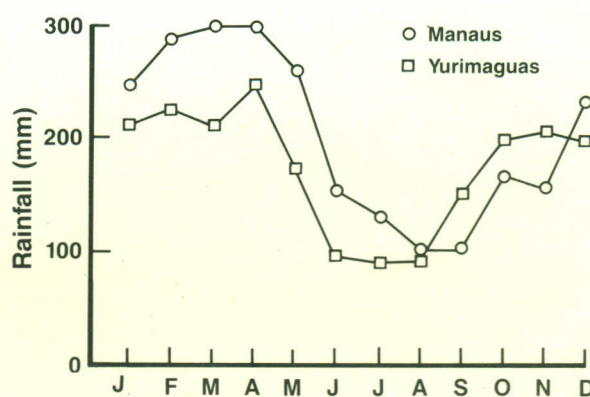


Figure 1. Long-term monthly rainfall averages in Manaus and Yurimaguas.

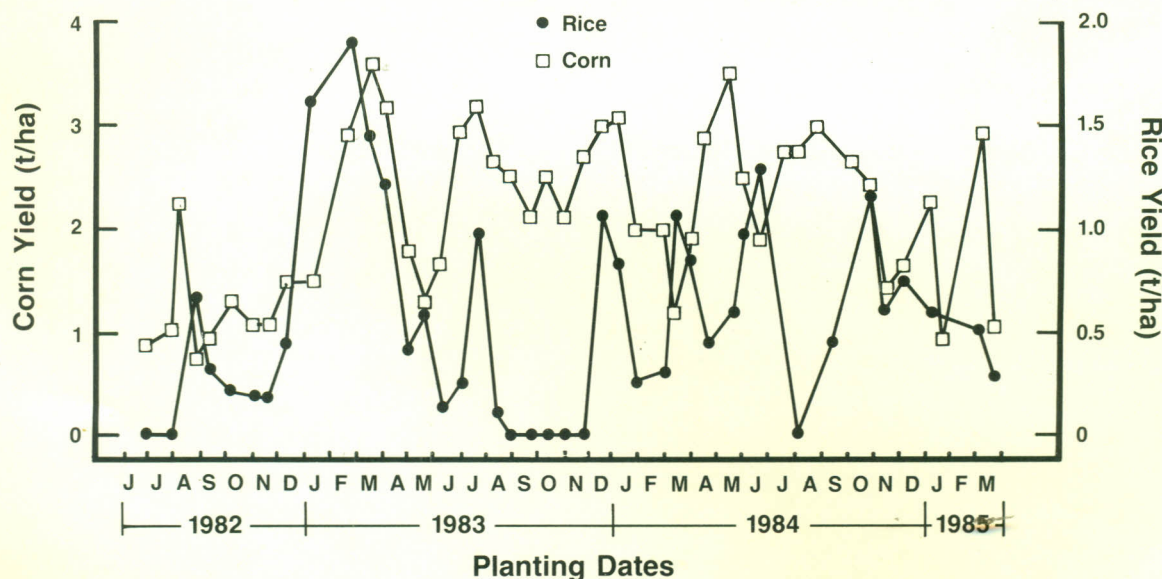


Figure 2. Effects of planting dates on corn and upland rice yields in Manaus.

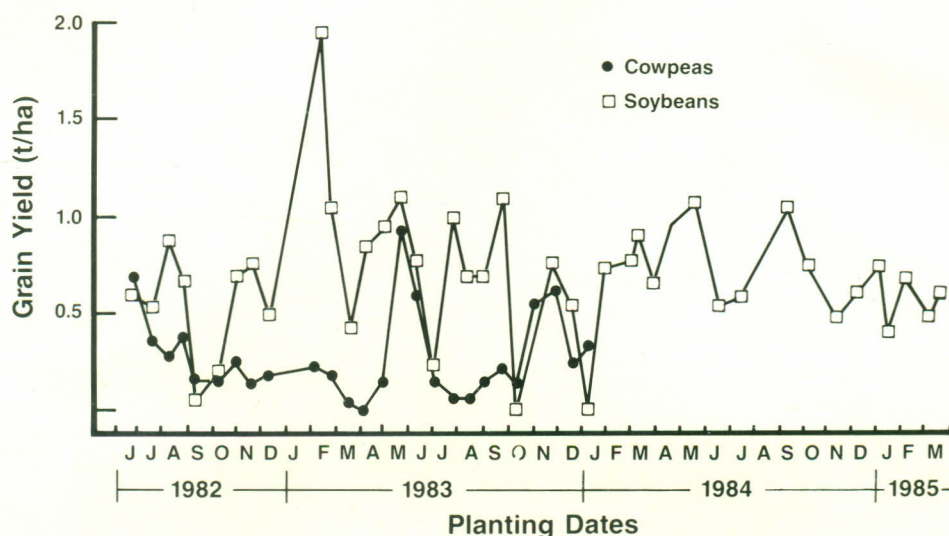


Figure 3. Effects of planting dates on cowpea and soybean yields in Manaus.

initial 12 months of the study. Subsequent increases in plant pathogens decreased maximum yields. Rice-seedling stands during the wettest planting dates were reduced by *Pyricularia oryzae*. Consequently, rice yields were influenced by the number of plants that survived (Figure 4). Optimum rice yields occurred in periods of high rainfall and good rainfall distribution throughout the growing season. In most years, these conditions were obtained with December-January planting dates.

Pathogens also limited yields on cowpea. There were no cowpea yields after an incidence of *Cbalcodermus* sp. in late 1983. *Rhizoctonia solano* was a problem for

cowpeas during periods of high rainfall. Rainfall from flowering to harvest was also a negative factor for cowpea yields. In 1984-1985, soybean yields were reduced by frog-eye spot disease (*Cercospora sojina*). In other experiments, where the buildup of pathogens was avoided, favorable cowpea yields were obtained with May-July planting dates. Soybean yields were highest when pods filled at the end of the rainy season. In normal years, this is most likely to occur with February-March planting dates.

Corn yields differed from the other crops by the large number of planting dates with similar yields. Low yields appeared to be related to poor rainfall distribution during early growth stages.

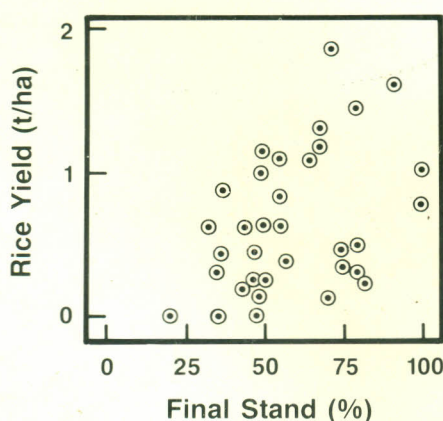


Figure 4. Relationship between upland rice yields and final stand in Manaus.

Conclusions

Results from this experiment and other on-site investigations have indicated the following periods of optimum planting dates for each crop:

- Rice: December-January
- Soybeans: February-March
- Cowpeas: May-July