

FRUIT SET SUCCESS OF THREE MANGO (*Mangifera indica* L.) VARIETIES BY USING RECIPROCAL CROSSES

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INTRODUCTION

Brazil is one of the most important mango producing countries with an area of 67,6 thousand hectares and production of 500 thousand tons (IBGE, 1999; FAO, 2001). However, approximately 80% of this area of exporting mango orchards in Brazil are established with Tommy Atkins variety. A monoclonal planting represents an enormous risk, considering that an attack of a specific pest and/or disease on a cultivar can destroy a regional mango industry totally. Therefore, there is a need for new cultivars with lower risk to the mango growers and better options to the consumer market.

The hybridization program being developed at Embrapa Cerrados in Planaltina, Federal District, Brazil, has the objective to create new cultivars with two or more superior characteristics than those of 'Tommy Atkins' (Pinto et al., 2000). Several varieties were introduced from different regions and countries and around 16 cultivars have been used as parental groups. However, parental incompatibility has been found in some crosses, which is a similar occurrence found in other breeding programs (Bally et al., 2000). The selection of compatible varieties to establish parental groups is highly needed to support the future crosses. This paper presents a study on compatibility among the three mango cultivar Amrapali, Mallika and Tommy Atkins, through reciprocal cross, and the influence of the environment, based on their fruit set successes.

MATERIAL AND METHODS

This study was carried out between July and August of 2000 at not irrigated experimental area of Embrapa Cerrados in Planaltina city, Federal District, Brazil. This area is located at latitude of 15° 35' 30" South, longitude of 47° 42' 30" and 998 m of the sea level. There are two distinct seasons: a dry and cool season (May to September) during flowering period and a rainy hot season from (October to April) during the fructification and harvest periods.

A completely randomized design with six treatments or crosses (Mallika x T. Atkins; T. Atkins x Mallika; Mallika x Amrapali; Amrapali x Mallika; T. Atkins x Amrapali; Amrapali x T. Atkins) and five replications (panicles) were applied, with a mean of the final stand of 88 flowers per treatment. To compare fruit set means, Tukey test with 5% of probability was applied. In order to decrease the cost of the breeding process, it was used the hand pollination technique of Embrapa Cerrados (Pinto, 1995), without the time consuming operation of spraying the panicles. Opened flowers were discarded in the afternoon, then protected with perforated polyethylene bags (Fig. 1). In the morning of the next day, young and still closed buds were removed, new opened flowers selected, emasculated and hand pollinated. Only one trained person was used to pollinated all flowers. The panicles were bagged again for two days, then removed. All panicles were tagged and number of setting fruits were recorded weekly, during six weeks, until fruit reaches a size, which natural falling is very low.



Figure 1 - After emasculatation and hand pollination, panicles are protected with polyethylene bag to avoid flower fertilization with undesirable pollens.

RESULTS AND DISCUSSION

In general, the fruit set of all crosses was very low. At the size named "little lead for rifle", the downfall of the fruit varied from 75 to 93%, while in the "marble" size this percentage decreases to 10-17% (Fig. 2). The spraying practice of the panicles on young fruits increased the fruit set from 1.5% to 6.0% at the harvest stage in previous work (Pinto, 2001). It seems that this result is not due to only genetic problem of parental incompatibility, but also due to influence of environmental factors. The low relative humidity and high water evaporation during the dry season contributed for the high falling of fruits and low fruit set (Table 1).



Figure 2 - At the size of "little lead for rifle" (first fruit from the right side) the downfall varied from 75 to 93%, while in the "marble" size (the sixth and seventh fruits from the right side) this downfall falling decreases from 10 to 17%.

Table 1 - Mean of climatic data during evaluation of fruit set (July to September 2000).

Climatic factors	Periods between weeks of evaluation				
	1st to 2nd	2nd to 3rd	3rd to 4th	4th to 5th	5th to 6th
Mean Temperature - (°C)	20.7	20.9	23.1	20.1	24.9
Max. Temperature - (°C)	28.2	29.7	31.6	31.5	32.7
Min. temperature - (°C)	15.0	16.4	11.8	14.8	16.4
Relative Humidity - %	79.7	83.6	56.2	66.7	41.3
Wind speed (m/s)	5.7	3.3	0.2	2.6	0.0
Rain (mm)	2.2	1.8	2.7	2.4	2.4
Evaporation (mm)	4.1	3.5	6.3	4.5	8.5

From the pollination to the first week of evaluation the fruit set decreased drastically. The best treatment showed a maximum of 25% of success, which represents 16 fruits from 64 pollinated flowers. None fruit was set at the final week of evaluation (Table 2), in all crosses in which 'Mallika' was used as female plant. The cross 'Amrapali' x 'Tommy Atkins' showed the best result, in which 2,9 fruits were set, representing 3,3% of success based on the total of 87 pollinated flowers. Except when crossed with 'Mallika', as female plant, all other crosses involving 'Amrapali' set fruits (Table 2 and Fig. 3).

Table 2 - Mean of number of fruits obtained from crosses of the parental groups during six weeks of evaluation (July to September 2000).

Parental Group	Pollinated Flowers (n°)	Evaluation Period (weeks)/Number of fruits					
		1 st	2 nd	3 rd	4 th	5 th	6 th
Amrapali x T. Atkins	87	6.3 c	6.2 a	4.0 a	4.0 a	3.2 a	2.9 a
Amrapali x Mallika	125	11.8 b	4.2 ab	2.0 b	1.7 b	0.5 c	0.5 b
Mallika x Amrapali	54	7.8 bc	3.0 b	0.0 c	0.0 c	0.0 c	0.0 b
Mallika x T. Atkins	68	13.3 b	1.0 c	0.0 c	0.0 b	0.0 c	0.0 b
T. Atkins x Amrapali	64	16.0 a	6.0 a	2.7 b	2.7 b	1.5 b	0.5 b
T. Atkins x Mallika	134	13.3 b	3.2 b	3.2 ab	2.2 b	1.2 b	0.5 b
MSD	-	2.0	1.8	1.2	1.1	0.6	0.6

Means with same letters in the column show no difference among parental groups through Tukey test with 5% probability. Variation coefficient ranged from 12% to 16%.

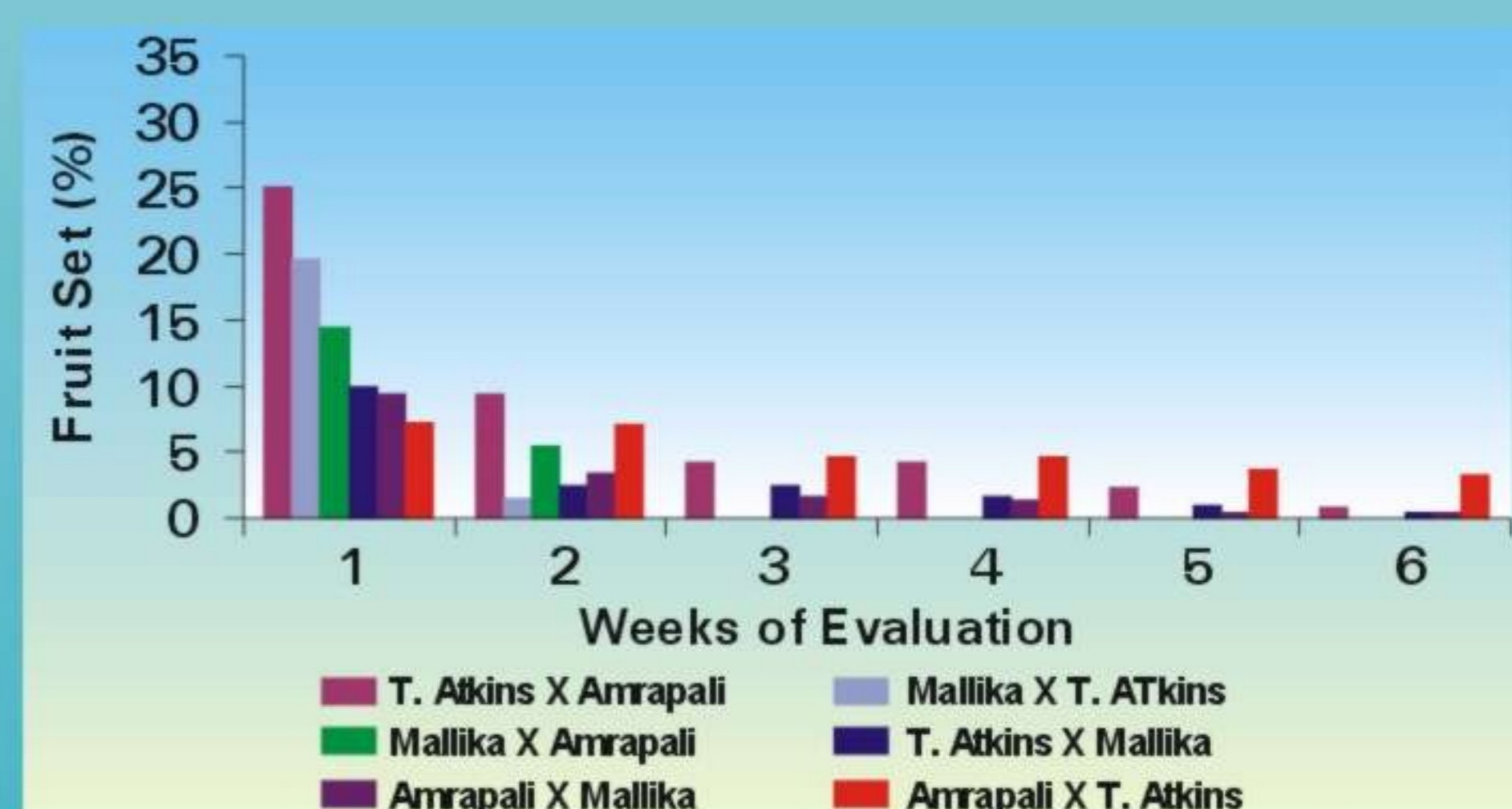


Figure 3 - Percentage of fruit set of the parental groups, based on the total of pollinated flowers, from the first to the sixth week of evaluation.

CONCLUSIONS

The results of this preliminar study on incompatibility of mango allowed the following conclusions :

- The fruit set success varied according to the varieties used in the parental group, showing a variable compatibility among varieties.
- The environmental factors, mainly the low humidity during season of the cross period, influence negatively on the fruit set of all crosses and promote a high falling percentage (75% to 93%) of fruits in the first week after pollination.
- After six weeks of evaluation, the variety Amrapali showed the best compatibility with other two varieties and fruit set varied from low (0.5%) to acceptable percentage (3.3%).
- Mallika showed a bad compatibility (zero fruit set) with other varieties, mainly when used as female parent.

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