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# INCIDENCE OF ACARINA ON THREE SPECIES OF URBAN LANDSCAPE PLANTS IN FT. LAUDERDALE, FLORIDA

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*Abstract.* **Three species of urban landscape plants, Surinam Cherry,** Eugenia uniflora **(L), Orange Jasmine,** Murraya paniculata **(L) and** Carissa grandiflora **(E. H. May) were sampled bimonthly during 1978 to determine the incidence of Arthropods frequenting the foliage. Representatives of 17 Acarine families were collected from Surinam Cherry, 12 each from Orange Jasmine and Carissa. Approximately 50% of the groups were phytophagous. Large numbers of phytophagous individuals were recovered from samples taken during May-June and November-December.**

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# PREHARVEST RESPIRATORY TREND OF THE FRUIT OF PRICKLY PEAR (OPUNTIA AMYCLAEA T)[1]

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*Additional index words.* Tuna, respiratory climacteric, respiratory quotient.

*Abstract.* **Studies conducted during two seasons (1977-78) on the developmental physiology of the fruit of prickly pear revealed the presence of respiratory climacteric during growth and maturation. A critical phase occurred 70 days after fruit set during which increases in $CO_2$ output and $O_2$ uptake, both in the whole fruit and in peel tissue discs, were noted confirming that prickly pear showed a preharvest respiratory climacteric. The respiratory quotient was always above 1.7 suggesting that the fruit utilized an organic acid substrate for respiration throughout the period of growth, maturation and ripening until harvest.**

The cactus *Opuntia*, which produces prickly pear is a native of Mexico although it is grown from Canada to Argentina. It is commercially grown in Central America, Peru and in some parts of Europe and Africa apart from Mexico. According to the data available for 1974, there were about 57,800 ha of prickly pear in Mexico with an annual production of 2.7 million MT. Of this, 10,850 ha corresponded to the improved, cultivated types whose production was valued more than 40 million pesos (9). In Mexico there are 6 cultivars (2) while South Africa has 15 of them (5). There is no information available regarding the existence of cultivars in other parts of the World. Prickly pear, commonly known as tuna in Mexico and other Latin American countries, is usually consumed in a fresh state and a small quantity is exported from Mexico to the USA and Canada whilst Japan and many other European countries have evinced interest in importing this exotic fruit.

Botanically, prickly pear is a many seeded berry consisting of a thick, green pericarp (peel) with a number of clefts of small prickles enclosing a sweet, luscious pulp intermixed with a number of small, black, shiny seeds. The fruit is ready for harvest 115-120 days after anthesis (9). Prickly pear like several nonclimacteric (Nc) fruits, is harvested ripe. It is highly perishable and lasts 8-10 days at room conditions. Therefore, extension of the postharvest storage life of the fruit poses serious problems. To develop proper techniques of storage for the fresh fruit, it is necessary to have a basic understanding of the development and postharvest physiology of the fruit.

In 1978, Lakshminarayana and Estrella. (10) studied the postharvest respiratory pattern of the fruit of prickly pear. They did not find a postharvest respiratory climacteric (Prc) and therefore suggested that it should be classified as a Nc fruit according to the classification of Biale (3, 4). Later in 1979, Lakshminarayana *et al.* while studying the development and postharvest physiology of the fruit of prickly pear found the existence of a critical phase during the growth of the fruit indicated by an increased $CO_2$ output accompanied by other chemical changes suggesting the possibility of the occurrence of a respiratory climacteric (Rc) during growth.

The object of the present study was to understand the respiratory behaviour of the fruit from anthesis through ripening employing more accurate methods of measuring respiration rates using tissue discs which may help in establishing maturity indices for harvest as well as to choose a proper technique for the storage of the fruit.

## Materials and Methods

From the moment of fruit set, 50 marked fruits were harvested at weekly intervals for determination of the respiration pattern of the whole fruit and the peel tissue discs and the respiratory quotient (Rq) employing methods already described in our earlier publications (9, 10, 11). The whole fruit respiration was done once in 1977 and twice in the 1978 season while the tissue respiration studies were conducted only during 1978.

[1]Laboratory and experimental orchard facilities provided by Drs. M. L. Ortega and F. Barrientos Pérez, Professors of the Post Graduate College, Chapingo, México are gratefully acknowledged.

## Results and Discussion

*Respiration of whole fruit.* Fig. 1 shows the respiration patterns of the whole fruit from anthesis to harvest maturity. Both curves obtained for 1978 were more or less similar with an initial high rate of $CO_2$ output during the first 2 weeks after fruit set which until about the 8th week showed a reduction. Subsequently, there was a spurt in $CO_2$ production around the 9th week which gradually decreased towards the end. On the other hand, the curve obtained for $CO_2$ output during 1977 showed lower values from fruit set and the spurt was noticed around the same time but spread over 2 to 3 weeks. It was however, interesting to note the evidence of a spurt in $CO_2$ production in both years of observation. The quantitative differences in the $CO_2$ output observed during both seasons was attributed to the changes in the prevailing climatic conditions during the course of the study.

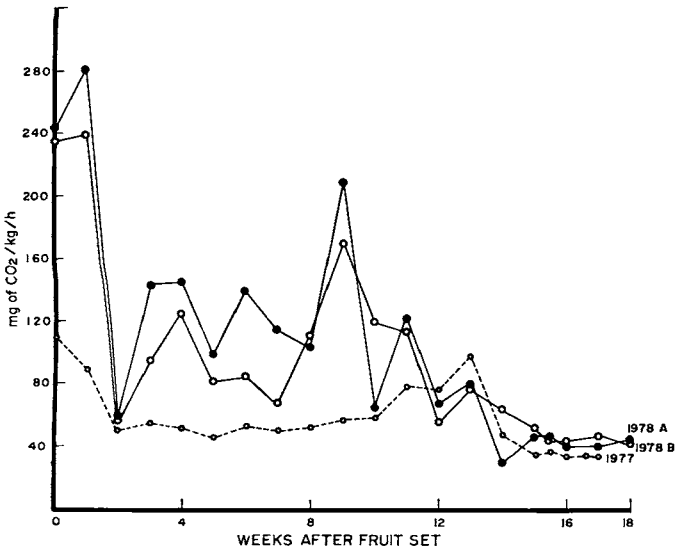


Fig. 1. Respiratory pattern of the whole fruit of prickly pear during development (1977, 1978).

*Tissue respiration and respiratory quotient.* Fig. 2 shows the respiration pattern of peel tissue discs of the fruit of prickly pear conducted during 1978. The up and down rythm observed in $CO_2$ output and $O_2$ uptake was mainly due to sampling errors. The line of 'best fit' fitted by eye for $CO_2$ indicated an initially high rate followed by gradual decline and then a sharp rise; where as the line of 'best fit' for $O_2$ suggested a steady uptake from the beginning followed by a rise coinciding with the rise in $CO_2$ output around the 11th week. The change in the equilibrium of $CO_2$ output and $O_2$ uptake observed in the respiration of peel tissue discs corroborates the pattern obtained with the whole fruit confirming the occurrence of respiration peak during growth.

Fig. 3 shows the pattern of changes in the Rq of the peel tissue discs. It was observed that Rq was high initially around 3 which steadily decreased towards the end to 1.7 suggesting utilization of organic acids through out the growth period. However, tuna fruit some days after harvest showed an Rq of 1, as was noted earlier (10), indicating the use of carbohydrate substrate only due to the availability of large quantities of free sugars.

Considering the data presented here, it is evident that tuna fruit shows a respiratory spurt during growth before attaining harvest maturity. This respiratory spurt coincided with significant increase in sugar content followed by other chemical changes (9). The absence of Prc and decrease in

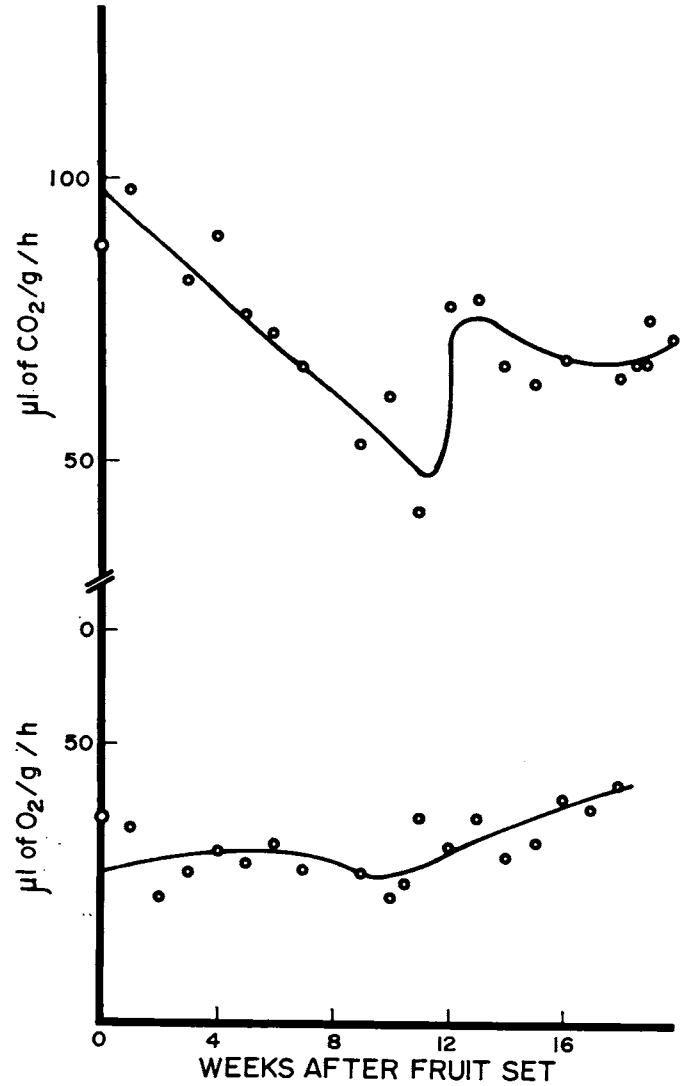


Fig. 2. Respiratory pattern of prickly pear peel tissue discs during development; lines of 'best fit' fitted by eye.

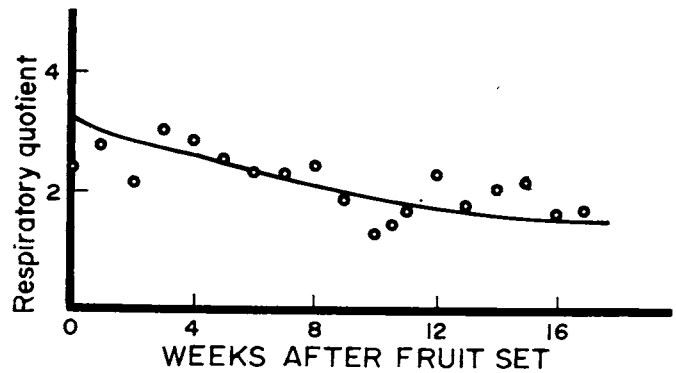


Fig. 3. Respiratory quotient of prickly pear peel tissue discs during development; lines of 'best fit' fitted by eye.

sugar content after harvest were considered as evidences for classifying the tuna as Nc fruit (10). Therefore, if we examine critically the complete respiratory behaviour of the Nc fruits in general from anthesis to harvest maturity and after harvest it is quite possible to encounter similar respiratory spurts during growth as observed in the tuna fruit. Evidences to this effect are available in the literature with respect to citrus and pineapple (1, 6, 12, 13, 14).

In conclusion, it is possible to theorize that the so called

Nc fruits pass the Rc during the final stages of development and ripening while on the tree, while the climacteric fruits show the Rc only after harvest. However, the climacteric fruits may fail to show the Prc if tested after attaining tree ripeness (7, 8, 15). Under these circumstances, it may in future, be necessary to consider the Nc fruits as fruits with preharvest respiratory climacteric while those ripening after harvest as fruits with postharvest respiratory climacteric. It is however, necessary to collect more evidences to prove beyond doubt the occurrence of a preharvest respiratory climacteric in other Nc fruits to establish this point of view.

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# EFFECT OF WAXING AND LINING MATERIALS ON STORAGE LIFE OF SOME CITRUS FRUITS[1]

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*Abstract.* **Effect of waxing and some lining materials on the storage life of 'Feutrell's Early' and 'Kinnow' mandarins, stored at room temperature, were studied. Waxing as well as lining materials reduced weight loss but had no effect on the physico-chemical constituents, however, ascorbic acid and citric acid decreased whereas sugars and sugar/acid ratio increased during storage. Both waxing and lining materials helped to maintain the external appearance of fruits. However, development of off-flavour was noticed in waxed fruit stored at room temperature.**

Citrus are among the major fruits produced in Pakistan and have good export potential if the postharvest deterioration and storage losses are controlled effectively. Moisture loss from fruit surface, resulting in shriveling, green and blue mold decay and internal black rot are mainly responsible for quality degradation and spoilage. Previous studies in Pakistan and abroad have shown that irradiation is not effective in extending the shelf-life of citrus fruits as irradiation doses required for the control of rot (175 Krad and above) deteriorate the quality causing skin-injury in the form of pitting (5, 10, 18).

Dipping of fruit in thiabendazole (TBZ) suspension; use of some lining materials and waxing had given encouraging results for extending the shelf-life of these fruits (1, 2, 9, 11, 12, 13, 17, 20). Combination treatments (TBZ with lining material or waxing) not only improved external appearance of the fruit but also reduced decay during storage both at room temperature and in the cold room. Off-flavour was noticed when waxed fruit were stored at room temperature (Unpublished data). Some modifications in the postharvest treatments to avoid off-flavour were tested on 'Feutrell's Early' and 'Kinnow' cultivars during 1976-77 and 1977-78 citrus crop seasons.

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### Materials and Methods

*Procurement, processing and storage of fruits.* 'Feutrell's Early' fruits were procured from the citrus garden of the Institute in December 1976. The stems were cut close to 'shoulders'. Bruised and injured fruits were discarded. Fruits were washed in tap water, and air-dried on wire trays. One control lot of 200 fruits was untreated while the other two lots (200 fruits each) were dipped for 2 min. in 1000 ppm TBZ. These fruits were further dipped in wax emulsions of 3 or 6% total solids for 2 min. each (a local wax-emulsion "Fruitex" with 18% total solids (TS) from the Pakistan Council for Scientific and Industrial Research Laboratories, Lahore). All the fruits were packed in perforated wooden boxes (36 x 30 x 18 cm size with 3 slits of 1 cm) lined with newspaper (0.093 mm thickness) and stored at room temperature (11-20°C).

'Kinnows' harvested near Faisalabad in February 1977 were placed in wooden boxes and transported to the laboratory by road over a distance of 40 Km. Methodology of processing 'Kinnows' was the same as described for 'Feutrell's Early' mandarins. The only difference was that 6% concn of wax was substituted for cellophane lining (0.030 mm