Locations and Cultivars for Indian Mango Production in the Americas

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Abstract
The air-shipment of mangos from India to the United States in the last 3 seasons has increased interest in the production of Indian mango cultivars in this hemisphere. However, reliable information is lacking on the suitability of the major Indian mango cultivars for specific growing regions in the Americas. Suitable locations, such as the northern deserts of Peru and the north-Pacific coast of Mexico must have sufficient cool temperatures and drought stress potential to attain consistent flowering. Based on over 15 years experience, ‘Mallika’ is proposed as a suitable cultivar in various locations and climates throughout the Americas. This cultivar offers adaptability, production advantage and fruit quality. Most locations that have ‘Alphonso’ trees in the Western Hemisphere have been unsuccessful due to lack of consistent flowering. Suitable climates must have low native fertility, cool winters and exceptional control over drought stress. ‘Totapuri’ is adapted to many locations, with good growth and flowering, but there are no data on storage and export. ‘Kesar’ is new to the Americas and as of yet untested.

INTRODUCTION
Mango producers, handlers and shippers of the Western Hemisphere continue to look for alternative cultivars for the fresh and processed market. The air-shipment of mangos from India to the United States in the last 3 seasons has increased interest in the production of cultivars of Indian origin in this hemisphere. Attractive prices paid per box and quality issues associated with the long distance transport and post harvest treatment of the exported product have made the production of these cultivars in the Western Hemisphere an opportunity for growers. However, reliable information is lacking on the suitability of the major Indian mango cultivars for specific growing regions in the Americas. The objective of the present work is to discuss some candidate cultivars and the specific locations suitable for their production.

IMPORTATION OF INDIAN MANGOS TO THE UNITED STATES
Air shipments of Indian mangos to the United States began three years ago. ‘Alphonso’, ‘Kesar’ and now ‘Totapuri’ are being flown to the United States for a select clientele who service the ethnic Indian community in the United States. There is also a growing interest in large-scale sea shipments from India to increase the volume and lower the unit price, but currently volumes remain low. Reported prices are high, generating considerable interest among western growers. To date all of the mangos imported have undergone a postharvest irradiation treatment for entry into the United States. Quality issues have been an obstacle to the importation, associated with irradiation treatment, the inherent nature of the cultivars and postharvest handling of the product.
INDIAN MANGO CULTIVARS

Many Indian cultivars have been cultivated in their present form for centuries, and they fit well within the specific production systems of India. Cultivars such as ‘Alphonso’, ‘Kesar’, ‘Totapuri’, ‘Chowsa’ and ‘Dushe’ are recognized for their specific quality traits and are sought after as fresh fruit, for pickling, juices, etc. Newer cultivars such as ‘Mallika’ are increasingly important and offer distinct advantages in terms of production and postharvest suitability for export.

Many Indian mango cultivars, including ‘Alphonso’ and ‘Totapuri’ were introduced into the United States over a century ago. In fact, ‘Mulgoba’ and ‘Totapuri’ were two of the earliest commercial mangos grown in Florida, following their introduction in the 1890s and early 1900s, respectively. However, most of the Indian cultivars imported to Florida were not well adapted to the humid, tropical climate, flowering inconsistently and suffering decay with the arrival of the summer rains. Eventually, Indian cultivars were replaced by a new generation of Florida-bred cultivars better suited to the climate.

Indian cultivars have been distributed around the American Tropics for decades, but most introductions have been unsuccessful from a commercial standpoint. Past failures have been for a variety of reasons, but in general the Indian mango cultivars have not adapted well to the conditions for the Western Hemisphere. More recent introductions of Indian cultivars, such as ‘Mallika’ have met with greater success, at least in Florida and parts of Mexico. However, there remains little commercial acreage of Indian mango cultivars in the Western Hemisphere at this writing.

GROWING CONDITIONS FOR INDIAN MANGOS

It is difficult to generalize about the nature of climatic and soil conditions within a country the size of India, but within the mango-growing regions across the country, the best fruit quality is attained in arid or seasonally dry (monsoonal) locations with sandy or rocky soils low in native fertility and with excellent drainage. The nitrogen status of the trees is traditionally maintained low to attain optimal fruit quality. Leaf nutrient concentrations of N (1.50%)-P (0.05%)-K (0.50%) are common in these regions. Site selection within the Western Hemisphere should focus on regions with similar conditions (Campbell, 2009). Soils rich in organic matter and native fertility should be avoided, opting for well-drained, sandy or rocky soils low in fertility. Well drained slopes above the valley floor often provide the ideal soil conditions, but have been avoided due to difficulty in production systems.

By proper site selection the nitrogen status of the tree can be adequately controlled to increase the consistency of flowering in any location. Regardless of site selection, if the Indian mangos are grown under standard western production systems common in most countries there will be little chance for success due to inconsistent flowering and poor quality.

SPECIFIC SITE SELECTION

There is little reliable information regarding the most suitable locations for the commercial production of Indian mangos in Western Hemisphere. The only fail-safe approach will be to make test plots to evaluate the suitability of each cultivar to the
specific locations. However, such trials have not been conducted and it seems unlikely that these will be accomplished in the short term. Therefore, the following cultivars and locations offers our best recommendations based on field experience and limited trials.

Based on over 15 years experience with ‘Mallika’ in various locations and climates throughout the Americas, this cultivar offers the best that the Indian mangos have to offer for adaptability, production advantage and fruit quality (Campbell et al., 2002). Flowering is consistent across a wide range of climates, although it is still best with cool, dry winters. The tolerance to anthracnose is excellent, while powdery mildew can be a problem in locations with low humidity, cool nights and warm days. However, many of the production regions of the mango in the Western Hemisphere have relatively high humidity during flowering and ‘Mallika’ excels in these locations. The fruit quality is excellent, but harvest must be made before the fruit achieve too advanced of a maturity on the tree. There is no information available on the tolerance of this cultivar to hot water treatment, nor its suitability for entry into the cold chain. The post harvest life is long under ambient temperatures. ‘Mallika’ is adapted to a wide range of production regions. It has performed well in the equatorial deserts of Brazil and the Pacific coast of Mexico. Care must still be taken to reduce the vigor of the trees and to maintain the trees at a low nitrogen and water status until flowering has occurred.

‘Alphonso’ is the cultivar that receives most attention among all of the mangos of India (Gangolly et al., 1957). The fruit quality is excellent and it has a wide flavor appeal among consumers. Most locations that have ‘Alphonso’ trees in the Western Hemisphere have been unsuccessful due to lack of consistent flowering. Suitable locations must have winters with consistent cool nighttime temperatures associated with dry conditions and low fertility. There have been no studies, nor observations to determine what critical temperatures are required, but locations that cannot provide this combination of conditions will have difficulties in the consistent flowering of ‘Alphonso’. The northern desert of Peru, in the region of Piura, Peru has shown potential for the production of ‘Alphonso’. The few trees under trial in this location have flowered, set and matured fruit with good quality. Another location with potential for ‘Alphonso’ is along the arid north coast of Mexico in the region of Los Mochis. The winters are cool, soils sandy and rainfall quite limited until mid-summer. This is also a fly-free zone, so the fruit would need no hot-water of irradiation treatment in order to enter the United States.

‘Kesar’ is grown predominantly in Gujerat State, India and is one of the important focuses of Indian exports to the United States. There are few trees in the Western Hemisphere and thus information is limited. It appears to be more adaptable to a variety of locations than ‘Alphonso’, particularly in its flowering. Yet, there is no actual experience with its adaptation to locations outside of Florida and only conjecture about its adaptability to hotwater quarantine treatments and the postharvest marketing change.

‘Totapuri’ is an important cultivar in India as a fresh fruit, for processing and for juices. As previously mentioned it was imported into Florida in the 1900s and has since moved around the Western Hemisphere. It grows and flowers well in a variety of locations. However, the tree is vigorous and the fruit are highly susceptible to anthracnose infection as they reach physiological maturity. In most regions of Mexico it grows and flowers well, but when the rains of summer begin the fruit quality suffers greatly.

Many other cultivars of Indian origin have been grown in the Western Hemisphere, including ‘Alampur Baneshan’, ‘Banganapalli’, ‘Chowsa’, ‘Dusheeri’,
‘Imam Pasand’, ‘Pairi’, ‘Panchadarakalasa’, ‘Pedda Rassam’, ‘Suvarna Rekna’ and ‘Van Raj’ (Campbell, 1992). To date none of these cultivars have attracted commercial attention. Even though they have been present for many years there remains little data on their adaptation to the growing conditions of the west.

CONCLUSIONS

There is potential for further exploitation of Indian mango cultivars in the Western mango industry, but there remain many obstacles to their adaptation to our management practices. In order to overcome these challenges a coordinated effort is needed to test these cultivars under local production conditions to determine their suitability. Production of Indian cultivars within the Western Hemisphere is quite limited at present. Some commercial examples are the production of ‘Mallika’ in Brazil and ‘Alphonso’ in Mexico. Other regions have established test plots of Indian cultivars or are in the planning stages. Without such testing and test marketing of the fresh fruit it will be impossible to predict the potential impact of these cultivars.

Literature Cited


