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MANGO IN PAKISTAN: A CHRONOLOGICAL REVIEW

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Mango is the second most important fruit crop of Pakistan after Citrus. Its chronology has been reviewed since 1957 to present. In 1970's, Pakistan was the second largest mango producer in the world that have dropped upto 5th level now and declining trend may continue if the crop production and management is not properly dealt. Maximum average yield (9.98 tons/ha) since 1957 was found in the era 1995-2001. Punjab surpassed Sindh in 1980's regarding area under mango cultivation and has been leading in average yield per hectare since 1960's. Now, Punjab is yielding almost double crop than Sindh. Major threats to mango industry of Pakistan involve unfruitfulness and malformation which needs thorough study of the problem and research work. Biotechnology offer solutions to many such problems in other crops but needs to be explored for mango in Pakistan.

INTRODUCTION

The Mango (*Mangifera indica* L.) member of family Anacardiaceae, is one of the most important tropical fruits of the world. Mango is called as king of the fruits (Purseglove, 1972). It originated in the South East Asian or Indo-Burma Region (Popenoe, 1932; Mukherjee, 1951). Mango varieties have been known for their attractive colours, savouring smell, delightful taste and high nutritive values. Fruit contains 10-20% sugar, an important source of vitamin A, C and a little amount of vitamin B, too.

Mango has been cultivated for thousands of years in India (Mukherjee, 1953, Kostermans and Bompard, 1993). Its cultivation is as old as Indian civilisation and has been cultivated in India for the last four to six thousand years (DeCandolle, 1884). Its development and culture in the sub-continent is mainly contributed by the Mughal Emperors especially Akbar who planted Lakh Bagh, amateur gardeners, nurserymen and farmers by means of selection and subsequent cloning. Now it is an integral part of our history and culture.

Mango can be grown on a wide range of soils, but deep, well-drained sandy loam soil gives the best results. The soil having hardpan, sticky clay and water logged conditions must be avoided. Mango can grow well on a wide range of pH (5.5-8.7). More flushes appear in rainy areas and consequently vegetative growth is high. Flower induction needs low temperature stress, an important feature of the sub-tropics or water stress under tropics. Hot and dry conditions are required at ripening. Winter frost is dangerous and detrimental even for the big trees. The environment of Punjab and Sindh is very much favourable and conducive for mango cultivation. Particularly we are not facing any serious problem in Punjab except mango malformation. Chronological spread of mango is studied since 1957 to 2002 in Pakistan and share contributed by its provinces (Punjab and Sindh). The determining factors of this very important fruit crop are described and discussed.

CHRONOLOGY IN PAKISTAN

Gradual increase is obviously recorded in the area under mango cultivation in Pakistan since independence. Maximum boost in the area in terms of difference per interval can be observed in 1960-1965 while minimum rise is found in 1975-80. As far as the production is concerned highest yield difference per interval (205.3 thousand tons) was observed in 1965-70 followed by 1960-65. It decreased gradually from 1980-95 while again considerable acceleration (97.87 thousand tons) occurred during 1995-2001. In terms of rise in average yield per hectare per interval, the

Table 1. Average area, production and yield per hectare of mango in Pakistan from 1957-2001

	1957-60	1960-65	1965-70	1970-75	1975-80	1980-85	1985-90	1990-95	1995-2001
Area (000, ha)	27.1	41.2	52.7	57.2	58	66.9	79	85.6	91.55
Production (000,tons)	178	305.6	510.9	558.4	564.8	649.2	732.8	816	913.87
Yield (tons/ha)	6.56	7.41	9.69	9.76	9.73	9.7	9.27	9.53	9.98

Source: FAO Production Yearbook, 1960-2001, Agriculture Statistics of Pakistan, 1960-2001
25 Years of Pakistan in Statistics (1947-1972)

highest values (2.28 tons/ha) more than the previous one were observed in 1965-1970 followed by the year 1960-65 (0.85 tons/ha) and 1995-2001. A slight but steady decline in yield was observed during 1975-1985. Maximum reduction in yield per hectare per interval was observed in the year 1985-90. Overall the highest average yield (9.98 tons/ha) since 1957 is found in the era 1995-2001 (Table 1).

a. Punjab

About 48.4% of the total mango area lies in Punjab province and the rest is in Sindh with very little acreage in the few frost-free pockets of the Balochistan and NWFP. Almost 70% of the mangoes of Punjab are being grown in divisions of Bahawalpur and Multan only. Punjab has shown maximum change in terms of acreage per interval (11.5 thousand hectares) under mango cultivation in the years 1985-1990 followed by 1960-65. Minimum values of increase in area lie in the year 1998-99 (less than 2 thousand hectares) while the decade 1975-85 depicted almost steady rise in mango acreage. Maximum rise in production (133.9 thousand tons) was found in 1965-70 followed by 1980-85. A huge sharp decline in production is shown in the period of 1975-80 despite the increase in acreage that may be due to new plantation (non-bearing). Second highest rise in production is observed (100.6 thousand tons) but increase in acreage is only 3.7 thousand hectares as observed in the very next interval. It seems obvious; uptil that time the new plantation would have started bearing. Almost steady rise in production is observed for the last nine years. As for as the average yield per hectare of Punjab is concerned maximum rise (5.09 tons/ha) is observed in the years 1965-70 followed by 1980-85 (1.98 tons/ha) and 1995-2001. Minimum rise in the yield per hectare is found in the years 1970-75 (0.8 tons/ha). Maximum production decline was observed in the year 1975-80 followed by 1985-90. Overall maximum yield (13.3 tons/ha) was found in the year 1970-75 followed by 1965-70 and 1995-2001 (Table 2).

b. Sindh

From 1957 to 1980 acreage under mango cultivation was more in Sindh (33.2 thousand ha) than Punjab and equalised in 1980-85. The area comparison revealed that mango cultivation in Punjab surpassed Sindh in 1980's and now it has more area (48.17 thousand ha) than Sindh (43.2 thousand ha). In the year 1998-99, Punjab (48.4 thousand ha) was having about 4-5 thousand hectares more area under mango as compared to Sindh and yielded about 278 thousand tons more fruit than Sindh. From production point of view Sindh has been the major mango-sharing province of Pakistan upto 1960's but in 1965 Punjab made good progress in mango production. In Pakistan, Punjab (592.5 MT) is a leading province in mango production and produces at present almost double than Sindh. As for as the average yield per hectare of mango is concerned Punjab has been leading over Sindh since 1960. At present, Pakistan's mango production is about 9.98 ton per hectare, while Punjab is yielding 12.3 tons/ha fruits followed by Sindh, and is producing about 4-5 tons/ha more mangoes than Sindh. (Table 2 and 3).

Table 2. Average area, production and yield per hectare of mango in Punjab from 1957–2001

	1957-60	1960-65	1965-70	1970-75	1975-80	1980-85	1985-90	1990-95	1995-2001
Area (000, hect.)	10.84	16.48	20.4	25.5	29	32.7	44.2	46.6	48.17
Production (000,tons)	71.2	122.2	256.1	340.6	282.4	383	465.7	530.1	592.5
Yield (tons/hat.)	6.56	7.41	9.69	9.76	9.73	9.7	9.27	9.53	9.98

Source: Agriculture Statistics of Pakistan, 1960-2001

Table 3. Average area, production and yield per hectare of mango in Sindh from 1957–2001

	1957-60	1960-65	1965-70	1970-75	1975-80	1980-85	1985-90	1990-95	1995-2001
Area (000, ha)	16.26	24.72	31.9	31.2	33.2	33.5	33.9	37.6	43.2
Production (000,tons)	106.2	183.36	252.2	215.1	255	260.6	260.4	273.4	320
Yield (tons/ha)	6.53	7.41	7.9	6.89	7.68	7.8	7.68	7.27	7.4

Source: Agriculture Statistics of Pakistan, 1960-2001

The above discussion revealed continuity in both area and production increase in Punjab than Sindh. The key factor in this regard seems to be the climatic difference

as Sindh is hot, humid and highly conducive to the growth of pathogens either fungal or bacterial. There could be a problem of water shortage in Sindh as in Punjab, the districts producing mango are located in Southern Punjab which have even better subsoil water particularly Multan to Muzaffargarh.

Though both soil and climatic conditions are highly suitable for mango production in Pakistan but still we are far behind than the major mango producing countries of the world in terms of yield per hectare. At present world is producing 23455 MT and exporting 509.8 thousand tons of mangoes. India is the largest producer (12000 MT) of mango followed by China (2142 MT), Mexico and Thailand with 50 other commercial producers of mango worldwide. Among mango exporters Mexico is at the top (209.4 thousand tons) followed by Philippines and India. Pakistan is standing at 5th place by sharing (916.4 MT) only 3.9% in the total world production. Total mango export from Pakistan is 40.2 thousand tons only and earning about 6 million US $ annually. Major importers from Pakistan are U.A.E., U.K. and Saudi Arabia. Exports can be lifted up rapidly by facilitating the growers and providing them incentives for production and subsequent export. (derived from FAO Production year book, 2001; Export promotion Bureau of Pakistan, 2000-2001 and Agriculture Statistics of Pakistan, 2000-2001).

Major Threats to Mango Industry in Pakistan

In 1970's we were the second largest producer of the mango in the world while now our position have dropped upto 5th level. The declining production of mango is a matter of great concern and has been caused by a complex of problems. The possible important factors of low yield besides negligence of the growers may involve somewhat complicated problems like

- unfruitfulness/poor fruit set and alternate bearing
- anthracnose, powdery mildew, mango malformation and die back diseases
- insect/pests like mango mealybug, mango hopper and fruit fly
- poor management practices like intercropping, no pruning, irrigation, nutrition and plant protection measures
- lack of post-harvest technology (i.e., poor harvesting, handling and packaging)
- lack of initiative and consequent continuation in mango research
- export incentives

Strategies to Enhance Production

Possible remedies to improve the production status of the mango in general and particularly in Pakistan may involve following measures:

- Orchards should also be fertilized by organic manures to improve soil fertility, soil structure and texture.
- Stress, proper pruning practices and judicial nutrition (especially nitrogen) must be given to reduce the vegetative growth rather to enhance blooming. Chemicals like paclobutrazol/cultar and KNO_3 can also be used to induce flowering.
- Continuous use of the macroelements increases the vegetative growth and further it minimises the availability and absorption of the microelements from the soil. Proper provision of the microelements must be ensured.
- Plantation on high pH soils must be avoided and the soils shall be treated with H_2SO_4.
- Proper management of the cultural practices, %age of fruit set, yield and harvesting of on and off year crop can effectively minimise the dilemma of alternate bearing.
- The dilemma of mango malformation is highly complicated and needs extensive research work. However, it is recommended that malformed panicles must be pruned carefully during April at pea fruit size and shall be burned/destroyed regularly. This may reduce it upto 60%.
- Judicious pruning and use of the plant protection measures will effectively minimise the insects.
- The proper and timely use of the fungicides may help in checking the growth incidence of powdery mildew and anthracnose.
- Varietal and area specific production must be implemented to further reduce the pathogen factor and improve the yield.
- Mango Mealy bug can be controlled by following systematic efforts of destroying its eggs and using sticky bands at proper times.
- Postharvest technology must be established and followed to minimise the losses in terms of quantity and quality having direct impact on the export status of mango.
- Germplasm extinction is happening at a very high rate as the old valuable indigenous trees are being cut/uprooted. Selection and cloning of new scions and standardisation of rootstock for mango shall be performed. Regular rather long-term breeding plans must be initiated in this regard to get the new improved cultivars.

- Broadened germplasm pool would provide solutions for the problems of unfruitfulness and the disease incidence by exploiting the available variation.
- Role of biotechnology and genetic engineering is highly appreciable in providing resistance against insects/diseases and improving the shelf life of the fruit. The research ventures to proceed in this area must be planned immediately.
- Last but never the least is the technology transfer to the farmer must be carried out by means of visits to the fields, seminars, workshops, and regular production and export oriented exhibitions.

SUMMARY

The soil, climate, the physical and environmental conditions, the major key factors required for a better quality mango production, are exclusively available and the conditions are extremely feasible for high quality yield in Pakistan. The problems involved are, however, of complex nature but can be effectively manipulated by systematic efforts as discussed earlier. The Government of Pakistan has a key role in this regard as the policies must be supporting and encouraging to the grower, to produce better crop, and the exporter, to export high quality fresh fruit and processed mango products in the world markets. Special flights to far markets for export will be an appropriate rather promising step in this concern. Role of breeding plans and biotechnology is of vital nature and must be given immediate attention. Following these suggestions we can retain our lost world ranking and a lot of foreign exchange can be earned for the betterment and prosperity of the country.

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