

# THE BANANA EPIDEMIC IN SINDH

## IMPORTED DISEASE OR DELIBERATE SABOTAGE?

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An epidemic in banana appeared in Sindh and in less than two years the banana is wiped out, Farmers do not know where to go. Below is an analysis by the author.

### Banana Varieties in Sindh

Sindh has two varieties of banana.

- (a) Cavendish dwarf (Basrai)
- (b) Cavendish Giant (William Hybrid)

#### (a) Cavendish Dwarf or Basrai

- Cavendish Dwarf is primarily winter banana (September to March with peak in November in Hyderabad and North Hyderabad).
- It is badly damaged by even ordinary winters of 45<sup>o</sup>F (7<sup>o</sup>C) and worse damage occurs if temperatures fall below 5<sup>o</sup>C (41<sup>o</sup>F).
- It also suffers from choking due to short distance from throat to first hand of fruit.
- Cigar end rot is another problem with this banana.
- Bunch tapers from top to bottom i.e., upper hands are larger and lower ones shorter.
- Mean number of edible hands varies from 10-13 and mean number of edible fingers is about 152.
- Its parent plant fruits after producing 40 leaves. The first ratoon crop also comes after 40 leaves but, the second and other subsequent ratoons come after producing 46 leaves. This means delay in 3<sup>rd</sup> fruiting and beyond
- The first crop usually is heaviest in weight per bunch followed by the second heavy crop of bunches. After this, weight of bunch is low and can remain the same, if enough fertilization is done.
- Chocking of bunches is very common, after start of winter (i.e., November).
- Bunches thrown in December and January usually choke.

**(b) William Hybrid banana**

- It is mutation of Cavendish from Fiji and fruits earlier than Basrai by about two or three months and occasionally four or five months. The reason being that it keeps growing in winters, whereas Basrai stops throwing new leaves from November to February. It also throws flowers after producing 30-43 leaves with average of 37, depending on availability of nutrients i.e., fertilizers.
- It has much bigger size bunch, with average of 40 Kgs, as against 27-30 Kgs for Basrai.
- It has longer neck or distance between throat and the first bunch and therefore, choking is not a problem as is with Basrai.
- This type of banana is popular in Australia, Israel and South Africa.
- It has better flavour and more sugar content than Basrai.
- Since it grows all the year around and as it has no bunch choking problems, it can fruit year around.
- Earlier fruiting cycle and large bunch, give it a yield, 50% more than Basrai.
- The suckers can be regulated to fruit in any month of the year, specially summer months, when prices are high.
- It does not suffer from sun burn and cigar-end –rot like Basrai.
- Its bunch is cylindrical i.e., all finger are similar in size and shape.
- It is taller than Basrai, but has with-stood winds of Sindh without propping up.

**The New Banana Diseases**

Unfortunately a new disease (virus according to this author) spread by aphids, has wiped out the plantations of both of the above two varieties. Economy of southern Sindh below Nawabshah has depended on banana since 1960. The thirty year boom has been brought to an end by the above disease. We have to diagnose the disease, find remedy or replace variety.

**Spread of the Disease**

The present banana disease (Bunch top) appeared in the coastal areas of Sindh some 2-1/2 year ago in fall 1988. Unconfirmed reports of Banana disease in India were in vogue since 1987. It was reported in Gujarat India in early 1988 and hit Sindh within a year. It is not certain if the disease in India is the same as in Sindh.

It is not a simple disease of local phenomenon. It could have come from India or could move from here to India and South-East Asia. It is very serious epidemic and can affect the world banana plantations sooner or later.

The early reports in Pakistan were that it was Panama disease, which had devastated large area in the Central America. This diagnosis was not acceptable to me as both Basrai and William varieties of Sindh are immune to this disease. Since the problem had started in coastal area of Sindh, I could not get the first hand information. Disease just travelled too fast and at a rate of 1 mile a week. In June, 1990 it was reported in Hosri adjacent to Hyderabad about 80 miles north-east of coast where it appeared first. Two months later in mid august I found a few diseased plants on my farm 14 miles east of Hyderabad. In November, 1990 it had reached Sekhat about 22 miles north of Hyderabad. Areas north of Sekhat were free in winter 1990 but they would be devastated up to Nawabshah before mid summer of 1991. With this will come to end, the thirty year story of banana boom in Sindh and cheap availability of it in Pakistan, Afghanistan and Iran. The disease came to Sindh so fast, that no scientist had time to be aware of it.

I had an American visitor Dr. Ostmark in January, 1989. He was working as Director of Tropical fruit research in Honduras and as a banana disease specialist, dr. Stover in his recent (1987) book on bananas, We had not heard of any banana disease in Sindh also showed him number of other farms, growing Basrai. He declared the banana in Pakistan was remarkably disease free and this was a new home for new varieties. When disease finally reached my farm I had a number of trunks removed from roots, dissected and examined the symptoms showed the following sequence:

- Bunch choking at throat (unusual for William Hybrid).
- Pseudo-stems un-damaged in the initial stage after choking of bunch.
- Start of real stem decay.
- Start of pseudo-stem decay, when real stem decay was advanced.
- Root system decay along with pseudo-stem decay.
- The whole plant in advance stage of decay and attacked by various types of insects.
- Suckers showing no signs of disease at this stage.
- Complete decay of real-stem followed suckers showing abnormal growth of new leaves.
- The Suckers showing gradual decline and never producing any flowers.
- Disease appearing comparatively dormant in Basrai in winter, but not in William Hybrid.

### **Conclusions after investigation**

The examination of dissection and subsequent analysis made me reach the conclusions that:

- It is not Panama disease.
- It is viral disease.
- It is carried by aphids which are small insects and are blown from field to field by summer winds blowing from south west to north east.
- Disease spreads mostly in summer and is carried by south-western winds towards north east.
- Infected leaves have pale green to yellow leaf margins and they have shape like W.

- Winter winds blow, from north to south and must be spreading the disease form north to south in areas already infected and therefore goes un-noticed.
- Aphids carry the virus in the blood stream, multiply and carry disease from plant to plant.
- Decay of plant material releases aphid population, which then moves from one plant to the other.
- Nematodes are mostly present in the soil as plant root predators, and reduce yields, but do not kill the plant altogether. They only decrease vigour and therefore yield of plant. Vigorous plants are not attacked by nematodes.
- Young plantations have more vigour and therefore will not get effected by viral disease in the early phase of disease.
- Diseased plant should not be replanted with bananas for a few years.
- Diseased plant material should be removed from field and destroyed by spraying with kerosene, killing aphids and other disease carriers.
- Suckers from diseased plants will transmit disease.
- New banana varieties resistant to viral disease suitable for Sindh environments need to be investigated and introduced.

I have been working on introducing new fruit varieties for Sindh and have introduced peaches, plums, apples, jojoba, jatropa, grapes in Hyderabad area, and feel that we could bring new banana cultivars suiting environments Sindh. They should be free from major banana diseases.

New varieties of bananas should be free from symptoms of bunchy top and Panama disease. This requirement is very difficult to meet.

- ❖ Gros Michel a variety of the Central America is highly susceptible; to Panama disease, though it is resistant to Freckle. It has two types like Cavendish group, the tall 20 feet height, and dwarf 10-15 feet fall.
- ❖ Cavendish variety already known in Sindh is susceptible to: Freckle but not Panama disease. Its dwarf varieties (Basrai and others) are susceptible to finger rot and choke-throat. The William is susceptible to Freckle and nematodes; where as dwarf (Basrai) is less susceptible to nematodes. Both have been susceptible to Bunchy top virus.

#### **Valery (of Taiwan or North banana**

It is 10-15 ft tall with 25-45 Kg. weight. It can stand cool weather but is susceptible to wind damage. Its yield is too low and about half of the present varieties.

#### **Hamuka (Bungulan Moule Criston)**

25 tall, 20-45 Kg bunch. It has poor keeping quality and is susceptible to wind damage. Its yield is also low and almost at par with Valery.

These problems with major varieties leave a very small scope for selection & the search cannot be limited to picking sucker of new variety off the rack.

Let us therefore have a look to the leading varieties:

Production per acre, of various types of banana else where and scaling them to possible yields in Sindh as compared to William Hybrid.

TYPES	YIELD PER ACRE
William Hybrid	8 - 12 tons
Basrai	6 – 9 tons
Bluefields	4 – 5 tons
Chinese	7 – 8 tons
Brazilian	3 -4 tons

### Diseases of Banana

The yield per acre discussed above in general for a new variety is discouraging to Sindh conditions and farmers will not grow them unless prices are increased, a yet another improbability.

It is essential to know a bit about banana diseases. They may give some insight into what new type to introduce.

**a) Panama disease or Panama Wilt**

It is wild disease, caused by soil borne fungus (*Fusarium Oxysporum Cubenesis*). It has done untold damage to Gros Michel variety. Bluefield bananas are specially susceptible. Plant often dies before bunch is fully mature the disease carrying organisms is spread through infected rhizomes, banana trash, machetes, soil and irrigation water.

There is no chemical control and the only practical method is replace Gros Michel with Cavendish group.

**(b) Singatoka**

It is caused by *Mycosphaerella muscolola*.

It results into low productivity by reducing photosynthetic area, due to destroying of leaf tissue, but it does not kill the plantations altogether.

**(c) Bunchy top.**

Bunchy top is viral disease discussed above.

Spread of virus is by aphids, which are blown by wind. Once a plant is affected aphids move from that plant to other and pass the disease on to others. Aphids travel long distances, when blown by winds.

- Once started it is difficult to control.
- Bunch top has more upright, ribs, and dark green to brown broken lines, running parallel to clean leaf veins.
- Broken lines, look like dash and dot.

### Control

Control of banana aphids can be achieved by systemic insecticides like: Roger R, demeto-s-methly (metasistox). But regular monthly sprayers over the whole of Southern Sindh are too un-practical unless aerial spray is resorted to.

Destroying all infected plants and spray with kerosene or oil

- (d) Moko  
It is caused by the strain of Bacterium Pseudo monassalano ceamm.
- (e) Nematodes  
They are found to be less damaging, specially if plantation has vigour, brought about by improved health, rich soil and nutrients.
- (f) Banana skipper.  
It curls banana leaves, but it has a predator and can be biologically controlled.
- (g) Black leaf streak.  
It attacks leaves by yellowing them and producing leaf lesions
- (h) Prickle  
It is a fungal disease and produces black or dark brown spots on leaves and fruits.  
It is common on Chinese, William and Brazilian varieties of Cavendish  
It can easily be controlled by sprays of Cuprarit, Zineb or mancozeb.  
Cu is avoided, as it leaves green colour on the surface of fruit.
- (i) Black leaf streak. (*Mycosphaerella fijiensis*).  
Reddish brown specks on leaf surface parallel to the leaf vein. Control is by oil sprays and cuprarit, Zineb and mancozeb, every 6 weeks during rainy season.
- (j) Cigar-end (*Hendersonula troloides*).  
It is caused by a fungus and is controlled by cupavid, zineb and mancozeb.
- (k) Nematodes of various types.
  - Burrowing (*Radolpholus similes*).
  - Root Knot (*Meloidogyne*).
  - Spiral. (*Helicolyenchus multicintus*)
  - Lesion (*Praty lenchus*)  
These are controlled by chemicals, like Nema cure and others.  
The other methods of control are:
    - Rhizome dip in water 122<sup>o</sup>-126<sup>o</sup>F for 15-20 minutes.  
Use or fallowed lands for new plantations.
- 1) Black Sigatoka (Produced by *Fungris*).
  - It reduces foliage which reduces fruit produces on affected stools.

- It reduces yield.  
Control is very difficult except replacement of variety.
- Insects  
Thrips  
Banana Skipper  
Aphids  
Beetles  
Bealy Bugs  
Weevil

### **Where do we go from here?**

- Either we find their disease and its control
- Or replace present varieties by other varieties, but producing same yield and fruit of similar merit.
- Replace banana by new fruit crops.

## **HIGH LIGHTS**

Pakistan's cheapest fruit banana, has 1000 k, calories per kg of edible portion of ripe fruit and 3400 kilo calories per kg of dried flour as compared to 3400 k. calories sugar, 800 for mango, 240 for papaya, 500 for orange, 1420 for dates and 1140 for Chicku. Thus banana has been food, fruit and sugar of common and rich population, of not only Pakistan but also countries to which it is exported from Pakistan, i.e., Afghanistan, Iran and Persian gulf countries, since past 30 years. This cheap fruit of common man in these Third World countries is now threatened with extinction by a virus. About 80% plantations are affected. Balance 20% will be affected by the middle of this year.

Production of bananas has already reduced to 50%. By end of 1991 it is going to come down to 25% and less in 1992.

Banana is going to turn into a Pakistani fruit which anthropologist will call, "The fruit that once was". This is only five years away.

Virus came like a swift storm. It travelled like sea wave with front of 80 miles, travelled one mile a week and wiped away banana plantations at rate of eighty square mile a week, covering more than 100 miles length from Sakro and Ghorabari to Sekhat and Mirpurkhas in tow years.

In next six months it is going to wipe out banana Nawabshah district. It is a calamity unheard of in Sindh's history of agriculture.

Each plantation is affected from about 50-100% depending on time of arrival. At this rate virus should wipe out total plantations by end of 1993 or latest 1994,

Even during the worst crisis of Afghanistan War, a minimum 50 truck loads (500 tons) of banana were carried to Jalalabad and Kabul everyday. Some times it was more.

Banana also went to Iran via Zahidan and also by boat loads to Iran and Persian Gulf Emirates.

Banana business kept fruit Mandis and plantations busy virtually like bees. It developed teams of specialised contracting services for cutting leaves, removal of trash, inter-cultivation to overcome weeds, fertilizer in-puts, harvest crew, loading crew, trucking services, middle-men on the farms as contractors and subcontractors, middle – men in the Mandis, ripping rooms, packers, and sellers down to street vendors. They existed even in small villages and towns in whole Pakistan.

The export trade was equally complex. The traders had contacts in various foreign Mandis. Profits of ordinary ill-dressed, ill-educated middle-men each year ran into multi millions of rupees and so the losses too, if borders of Afghanistan and Iran were closed down once in a while during past 12 years.

Contractors paid 20% only of contract value of the first crop in advance. The rest he paid while he earned. Many contractors settled permanently on the contracted farms. They were Punjabis, Mohajirs, Pathans, Balouchis and Sindhis. The sub-contracts were seasonal and engaged when needed. The labour working for sub-contractors worked 4-5 hours a day and got more wages than urban labour but he was employed only 50% of his time, living on credit, advanced by shop keepers and village hotels.

Hotel business developed even in small villages. They entertained the client-age by radio, tape records, and television. Video-movies were shown on payment of Rs. 2.00 per head. Money brought worldly goods as well as vices. Tea drinking and Tobacco smoking increased. Even rural worker smoked factory made cigarettes. Charas became common in rural areas.

Paid labour got awareness. He voted as per his own choice and convictions. He broke loose the chains of permanent slavery to Zamindars. The changed loyalties brought him some freedom, though he was always afraid of being harassed by the police.

All this is going to be a story of the past, within next two years.

Present author does not have immediate solution to the postponement of banana demise in Sindh. Although I can see some possibilities but solutions are too complex, too technical and government organisations in general are not geared, either to quick decisions or quick results. There is no time for long term experimentations with new varieties, with which Sindh fiddled for some 20 years before introducing Basrai in Sindh in 1950s. Our Mirpurkhas, horticulturists, Rizvi, Jagirdar, Rajpar and Pirzada had prepartition predecessors for some 10 years. We cannot wait for 20 years. We better forget about it then. We have to introduce new varieties and soon enough. Dr. Stover was invited to have a look into the disease. His arrival on February 15, 1991, was postponed due to gulf War then and now due to stopping or curtailment of US-AID. When he comes he will only talk about the present diseases. His terms of reference do not go beyond. More funds will be needed for recommendation of varieties. The recommendation cannot be specific. It will be long list of varieties and final recommendation will be biblical i.e. “Seek and



Ye shall find". In the mean time patient will be dead fro years, only to rise by re-incamation after many years if at all.

During the past 10 years, the prices of banana during the peak season at the farm gate have varied between Rs. 30 to 70 per 40 kgs. This is about 20% or less of prices of a reasonable quality of mangoes. The banana thus is cheapest fruit of the country.

The farmer gets only 10% of retailed prices of bananas for raising it. If the contractor raises the crop and sells it in the Mandy, then alone he gets 20%. The balance 80% goes to various other categories of middle men from the Mandi agent to the street vender. This is how banana economy has benefited population of the country.

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