

# The best technologies at work for the smallest farmers



24th Annual Report 2010-2011



# Founder's Conviction



The Founder inherited farming instincts. Moreover, as a first generation entrepreneur, he also had hands-on experience regarding all aspects of farming.

A strong desire and determination to establish cutting edge technology propelled him on growth path with these convictions:

- In India, 70% of over 1 billion people are associated with agriculture. Agriculture symbolizes their culture, not only their economy.
- Transformation of our agrarian society into an industrial society will take centuries.
- In the meantime, there is no escape from taking the help of Science & Technology for agriculture, agri-business and agri-industry.
- Such an approach alone can ensure long-term food security, sustainable & inclusive growth and self-reliance.
- No other sector's progress, howsoever phenomenal, can substitute the development of agriculture.
- There is no gainful agriculture without irrigation. Therefore, availability and management of water holds the key for future agricultural progress – its production and productivity. "More Crop Per Drop" should become a national priority.
- Availability of water by itself does not guarantee higher productivity or production. Irrigation water has to be pumped right up to the farm boundary and thereafter distributed up to the root zone of the crop.
- Growing population, urbanization, industrialization and cropping intensity will reduce overall availability of water for agriculture and increase the need for energy. Hence, water without energy or shortage and poor quality of energy will continue to be a bottleneck for future agricultural growth.
- In keeping with our "conservation" theme, we shall promote use of green energy not only for homes or industries but also for agricultural applications.

# Corporate Philosophy



## **Mission**

Leave this world better than you found it.

## **Vision**

Establish leadership in whatever we do at home and abroad.

## **Credo**

Serve and strive through strain and stress;  
Do our noblest, that's success.

## **Goal**

Achieve continued growth through sustained innovation for total customer satisfaction and fair return to all other stakeholders. Meet this objective by producing quality products at optimum cost and marketing them at reasonable prices.

## **Guiding Principle**

Toil and sweat to manage our resources of men, material and money in an integrated, efficient and economic manner. Earn profit, keeping in view commitment to social responsibility and environmental concerns.

## **Quality Perspective**

Make quality a way of life.

## **Work Culture**

Experience : 'Work is life, life is work.'





# Technology and Development

## Agriculture

### Ultra High Density Mango Plantation : Game changer in the way mango is produced

India is the largest producer of mango in the world. However, our productivity is the lowest—6.38 mt/ha (2.56 mt/acre). Traditionally about 40 mango trees are planted per acre and the tree starts to bear fruit only from year 5 but commercial bearing starts after year 8-10. The Company has been working on improving the yields of the mango farmers and towards this end, started to experiment with changing agronomical practices.

The Company started working on UHDP of mango in 2006 and brought this technique for commercial utilization. Performance of UHDP under field R & D has been very promising besides several other advantages

Year	Orchard Age	Yield (Mt/acre)	
		Ratna	Alphonso
2009	3 Year	4.0	1.4
2010	4 Year	6.4	1.5
2011	5 Year	8.99	3

#### Benefits of UHDP and associated technologies :

- Increases productivity by 2-3 times the normal yield.
- Reduces orchard gestation period to three years as compared to conventional (8-10 years) management.
- Renders orchard crops as profitable as other cash crops.
- Reduces water used for irrigation by 50%.
- Increased fertilizer use efficiency due to fertigation.
- Consequent saving up to 30% of applied fertilizer from the recommended dose is possible.
- Reduces NO<sub>3</sub>-nitrogen leaching (thereby preventing nitrate pollution) by 50% when fertigation is practised.
- Controls weed growth as water is applied only to the root zone.
- The Company has now perfected the practice of Ultra High Density Plantation in Mango on a commercial scale resulting in doubling of yields and start of commercial production from the third year itself. The Company has now undertaken an extensive program to propagate this technique.



### Cashew Cultivation - A New Approach

Cashew is one of the rain fed crops cultivated with marginal inputs resulting in very poor yield of 700kg nuts per acre. We are trying to reverse this situation by bringing this crop under high tech management practices. Primary experiments have revealed very encouraging results with fruiting from second year itself. We are expecting to touch 2 tonnes yield per acre in the fifth year. Cashew plantation is established at 3m x 2m spacing as against the conventional planting methods.

### Drip Irrigated Rice to Improve Water Productivity

We have been carrying out experiments on drip irrigated rice for over four years. During the last year ten rice varieties were tested for suitability under drip irrigation. All of them performed well under drip and out yielded flood irrigated plots by 15 to 35 percent with increase in water productivity.

Variety	Type	Yield Kg/acre		% Yield Increase	Water Productivity (Kg/M <sup>3</sup> )	
		Flood	Drip		Flood	Drip
Variety A	Basmati Type	2435	3276	34.53	0.130	0.688
Variety B		2314	3056	32.06	0.123	0.642
Variety C	Medium	2811	3691	31.30	0.136	0.702
Variety D	Fine	2535	2967	17.04	0.135	0.573







# Technology and Development

## Wheat Cultivation with Drip Irrigation

Efforts to increase productivity of wheat revealed that drip irrigation can increase yield by 15-30% in Central India besides saving water use by 20-28%. Trials with drip irrigation yielded 2200 kg per acre in comparison to 1877 kg per acre under flood irrigation at Nasik. Experiment at Jalgaon revealed similar trend with 1620 kg per acre under drip as against 1190 kg per acre under flood irrigation.

This technology can revolutionise wheat cultivation if adopted in the major wheat growing areas of the country besides saving water applied for irrigation.

## Mechanization of Onion Cultivation

Day to day reduction in availability of farm labour and increase in wages are threatening the production of onion for processing. Mechanization is comparatively easy for large farm operations. But it has limitations in small land holdings. Efforts were made to mechanize onion seed sowing and harvesting operations for small farmers which saves 75 to 100 man days per acre. This will help us in expanding onion contract farming and will also help the onion farmers in general.





### Aonla

A collection of germ plasm from various sources is maintained. It is used for chemical and molecular analyses for authentication of varieties and other useful traits.

Biochemical studies on the development of fruits of different varieties have been carried out. These studies provide information on the pattern of accumulation of medicinally important components (poly phenols, tannins, vitamin C) of the fruit.

### Cotton

In Central India most of the farms have very little irrigation water during summer, as wells and ponds dry up or have very limited water. To mitigate this situation, the Company standardized a new agro-technical approach for cotton cultivation. Hybrid cotton varieties with Bt gene sown in the second fortnight of May with drip irrigation support from the limited water resource and scientific crop management have been very efficient in increasing productivity. It is worth mentioning here that availability of 5000-10000 litres of water per day per acre is enough to raise the crop till the monsoon arrives. After the monsoon, water availability in wells improves significantly to irrigate the grown up crop. Using this technology, farmers are able to get yields of 15 to 32 quintals per acre. In addition to yield increase, early sowing helps in raising the crop with lesser infestation of sucking pests.







# Technology and Development

## Bio-Technology

**Banana :** Jain Tissue Culture technology has created a revolution among banana growers through out the country because of its unique product quality which has been achieved by continual improvement during the last 17 years. With this technology, banana growers are able to harvest 270-300 MT/Hectare yield from three crops including two ratoon crops and one main crop within 30 months as against 50-60 MT/Hectare from one crop in 18 months with the conventional method of cultivation. The vertical growth of the activity is remarkable. On the one hand it is the highest number of saplings sold by a single company in the world and on the other, the product is gaining popularity among the farming community because of its advantages as reflected in the demand of the product. The activity which was initiated by selling 50000 saplings in the year 1994-95 is poised to touch 30 million saplings by 2011-12.

The technology helps increase the benefit to cost ratio of the crop so that agriculture becomes a sustainable business. The technology also helps save natural resources like water, energy, fertilizers etc. to a great extent. Most importantly, the quality of the fruit using Jain Tissue Culture saplings is internationally comparable. This gives the farmer an additional and assured market for his produce.

**Pomegranate :** 2006 was a critical year. India was poised to surpass Iran in pomegranate production to achieve the No. 1 status. However, misfortune struck and the pomegranate plantations were affected by a deadly disease called Bacterial Blight and farmers had no option but to simply uproot the plants and destroy them. Suddenly, there was scarcity of planting material and no solution to the deadly disease.

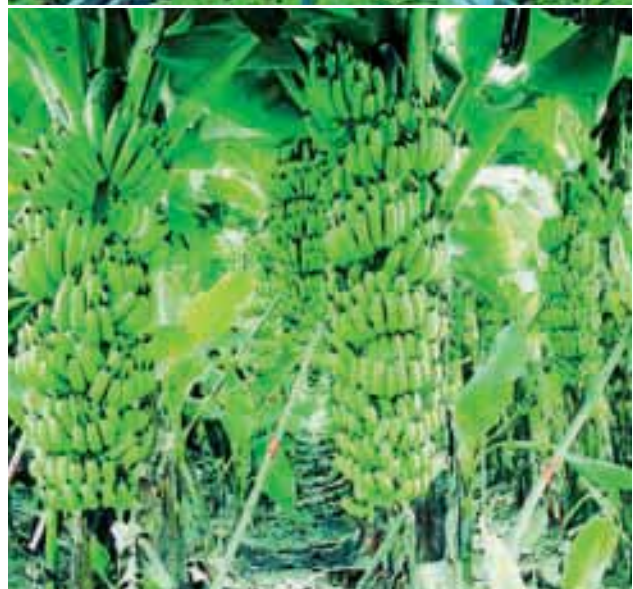
The Company stepped in to fill this void. On the one hand the Company collected authentic germ plasm of different varieties from all over the world and set up a trial to study disease resistant varieties; on the other, it started to work on developing a protocol of propagation of the planting material using the tissue culture technique.

Pomegranate is considered to be the most difficult crop for propagation through tissue culture. However, through our unstinted efforts, the group has now been able to commercialize high quality tissue culture planting material of pomegranate.

Many crucial stages involved in the tissue culture of pomegranate were successfully overcome; that has made our laboratory a resounding success.

(i) Establishment of initial tissues is the most crucial stage observed in pomegranate where we spent more than one-half year of the total research time for standardization.

(ii) This is in contrast to other institutions that started this activity a couple of years back and are still struggling to be successful.



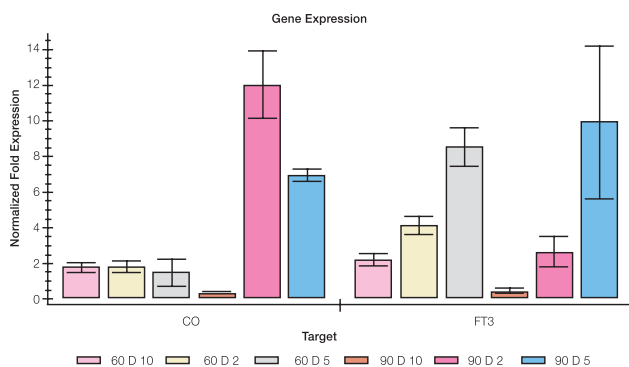


(iii) The Company overcame various obstacles in micro-propagation and has today achieved this landmark. 300,000 TC plants were distributed free to the farmers in the year 2007-08 the clock back. The TC pomegranate plants are disease free; they also yield almost double the quantity, vis a vis conventional planting material, with early fruiting. The Company plans to produce 2 million TC pomegranate plants this year.

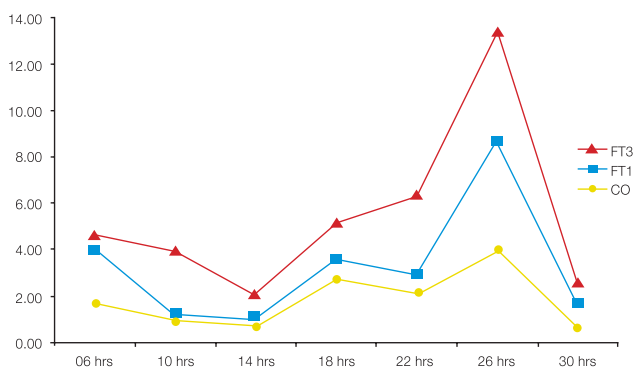
### Study of flowering genes of Banana and Onion :

Flowering and fruiting are the most important events in crops where seed or fruit is used as commercial harvest. Time/season of flowering plays an important role in deciding cropping period, planning planting and harvesting time and other cultivation practices like application of water and fertilizers. Flowering is governed by several environmental factors like photoperiod, temperature and internal plant factors like plant hormones, flowering, nutrition etc. We are trying to elucidate the molecular pathway of flowering in banana and onion which will help us improve these crops in the required manner. Till date we have identified seven genes in banana and five genes in onion related to flowering.

### Expression of Constans (Co) Flowering Locus T (FT3) in banana at different crop age



### Diurnal Expression of Flowering Locus T (FT1 & FT3) and Constans (Co) genes of banana





# Technology and Development

## Food Processing

### Fruit Processing

The fruit processing plant of the Company has many innovations to its credit which have resulted in higher productivity, better quality and lower costs to the Company. Some of the innovations have now been adopted industry wide, changing the face of the entire industry.

### Fruit Ripening

One such path breaking innovation has been ripening of fruits. Traditionally mangoes were ripened by using dried paddy straw, which resulted in inconsistent ripening and loss of precious fruits. The process also required huge amount of labour. Further, the industry used banned chemicals which were harmful to health. The Company adopted the concept of Green House to design an Evaporative Cooling and Ripening Chamber and standardised the process of ripening resulting in uniform ripening, reduction in ripening losses and doing away with banned chemicals. The innovative technique has now been adopted industry wide resulting in productivity gains and better quality.

### Refining of Mango Pulp

In India, the largest variety which is processed is Totapuri Mango. This variety suffers from a quality issue on account of seed damage. The fragments of damaged seed in the form of small specks come in the pulp giving it an unpleasant appearance. The entire industry used to struggle to control these specks by resorting to the manual process requiring large number of skilled labour apart from limitations in terms of quantity of fruits processed and other quality issues. The Company worked with equipment vendors to modify and adopt existing decanters (horizontal centrifuges) to accomplish the task of mechanical removal of these specks. This adaptation has now been accepted industry wide resulting in huge savings in costs, better productivity and quality.

