

Success is Sweeter than Sugarcane, through Precision Farming

Background and Objectives

Sugarcane is an important commercial crop in India. India ranks second in the world, after Brazil, in terms of area (4.1 m.ha) and sugarcane production (355 million tonnes in the year 2007), though in terms of productivity it stands at tenth position (61.95 tonnes). Sugarcane in India is grown in two distinct agro-climatic regions – the tropical (largely comprising Maharashtra, Karnataka, Gujarat and Tamil Nadu) and the sub-tropical (Uttar Pradesh, Punjab, Haryana and Bihar). The yields are substantially higher in the tropical belt as compared to the sub-tropical regions.

There are 35 million farmers growing sugarcane and another 50 million depend on employment generated by the 571 sugar factories and other related industries using sugar. Among the states, while Uttar Pradesh dominates in area (2.25 m.ha) and production (134 MT) of sugarcane, in terms of productivity, Tamil Nadu leads with 105 T/ha.

In Tamil Nadu, sugarcane is the most important commercial crop, covering about 3.35 lakh ha, of which 63.4% is planted and 37.6% is *ratoon*. Villupuram, Erode, Cuddalore, Thiruvannamalai, Vellore, Perambalur, Thanjavur, Dharmapuri, Namakkal and Salem districts together accounted for almost 75% of the total sugarcane area of the state.

Precision farming in sugarcane was being practised by farmers in Dharmapuri and Krishnagiri districts of Tamil Nadu between 2004 and 2007, and had resulted in considerable economic prosperity in the area. With the advent of Rashtriya Krishi Vikas Yojana and the flexibility it provided the State in terms of project selection and implementation, the State put in place an ambitious plan to upscale practice of precision farming in sugarcane through cluster approach, wherever controlled irrigation is possible across the State.

Intervention

During the initial years of RKVY funding (2007-08 and 2008-09), Precision farming included Sugarcane, Cotton, Maize, Banana, and a whole lot of horticultural crops. Considering the importance of Sugarcane and other agricultural crops, separate projects were posed before the SLSC titled “Precision farming for agricultural crops”. With an annual coverage of 4000 ha, this project was implemented during the years 2009-10, 2010-11 & 2011-12. A total outlay of Rs 137.89 crores has been provided under precision farming for the years 2007-08 to 2011-12.

The major theme in expanding precision farming is “*Save Water & Electricity*“. With less than 60 % of the net cultivable area under irrigation, any saving in water through precision farming over conventional farming would lead to expansion of the area under irrigation. At present, farmers are not charged for their electrical energy consumption for lifting water, therefore, any saving in water would also result in minimising the energy consumption.

The success of Precision farming in Krishnagiri & Dharmapuri districts during the period 2004-07, formed the basis for up scaling precision farming in other districts. “*Cluster approach*” was followed for implementing the project. A 20 ha cluster involving 20 farmers was the norm followed; wherever contiguous farm holdings were not available, a virtual cluster was formed. The farmers of each cluster formed a group, registered themselves under Society Registration, maintained records, elected their leaders and approached the Department of Agriculture for assistance under RKVY.

It was proposed to dovetail the programme with Micro Irrigation Programme of Government of India with 50% subsidy. However, the micro irrigation systems adopted under precision farming are more intensive than that prescribed under MIP of GoI, and often cost of such systems exceeds Rs.80,000 per hectare. Therefore subsidy assistance was provided under RKVY for farmers for which they could register online. The groups of farmers of each cluster were given technological training on precision farming at Tamil Nadu Agricultural University or its Research Stations located close to the cluster. In addition, exposure visits were arranged to locations which had registered early success in precision farming.

The project is spread across 28 districts of the State and concentrated in sugarcane growing tracts and areas where ground water is the major source of irrigation. The key success of the project results from the precision application of water, nutrients and plant protection chemicals that results in uninterrupted growth and development of Sugarcane. The timely application and in right quantities enabled longer internodes in Sugarcane thereby pushing the height of the crop and thereby its yield.

Water soluble fertiliser is a critical input that plays a major role in increasing the crop productivity and it has to be essentially applied with the recommended dose as prescribed by Tamil Nadu Agricultural University. The same, while being expensive, when applied in right quantities and right time enhances higher fertiliser use efficiency, saves labour and increase internodal length and thereby productivity in sugarcane.

Year wise spread of project across districts (2007-08 -2010-11)

Districts	Area covered in (ha)				No. of Sugarcane farmers benefitted		
	2007-08	2008-09	2009-10	2010-11	2007-08 & 08-09	2009-10	2010-11
Coimbatore	500	-	-	100	374	-	-
Cuddalore	90	350	40	380	440	40	380
Dharmapuri	470	-	100	300	359	100	300
Dindigul	500	-	-	-	40	-	-
Erode	180	300	-	200	440	-	200
Kancheepuram	100	90	-	-	40	-	-
Karur	410	190	260	200	460	227	200
Krishnagiri	500	-	-	-	88	-	-
Madurai	90	90	-	-	160	-	-
Nagapattinam	40	90	60	120	130	60	120
Namakkal	500	-	500	500	350	235	349
Perambalur	500	-	880	500	500	880	500
Pudukottai	90	90	120	200	180	120	200
Ramnad	140	-	-	-	140	-	-
Salem							

Sivagangai	450	40	660	500	290	490	500
Thanjavur	100	350	700	320	420	700	320
Theni	100	100	-	-	200	-	-
Thoothukudi	100	360	-	-	322	-	-
Tirunelveli	100	100	-	60	133	-	-
Tiruppur	100	400	-	100	480	-	100
Tiruvallur	20	100	-	100	120	-	-
Tiruvannamalai	90	90	-	-	160	-	-
Tiruvarur	100	400	60	100	500	60	100
Trichy	90	90	40	40	180	40	40
Vellore	90	350	-	-	362	-	28
Villupuram	90	350	-	40	440	-	-
Virudhunagar	450	-	580	240	440	580	240
	90	350	-	-	284	-	-
Total	6,080	4,280	4,000	4,000	8,032	3,532	3,577

Note: Besides Sugarcane, the other crops covered under this project by the Department of Agriculture are Maize, Cotton, Groundnut and Sunflower.

Outcome

S. No.	Crop	Yield(MT./Ha)		Increase in yield with the introduction of Precision Farming	% increase in yield with the introduction of Precision Farming (Rs)
		Before PF	With PF		
1.	Sugarcane	105	183	78	90

The average yield of about 90-100 tonnes/ha in conventional farming, has increased to 160-170 tonnes/ha on a conservative estimate. There are several instances of higher yields in each district where precision farming was practiced.

Precision farming, which remained a success in select districts of Tamil Nadu, had been extended across the State through RKVY assistance. The introduction of drip irrigation (in many cases sub-

surface drip) has brought it wider spacing of crops (five feet broad beds between furrows where the drip line passes). This wider spacing is made good with a rain fed intercrop (mostly pulses) that nourishes the soil; intercrop also curtails weed growth during initial stages of sugarcane development. Application of fertilizers and plant protection chemicals through drip lines minimizes input cost and the farmers can now manage these operations themselves, which were otherwise dependent on hired labour.

The difference that precision farming made to the farmers' incomes comes from savings on account of cost of inputs and labour on one hand and the increase in productivity (yield) and the milling quality of the canes (in terms of sugar recovery on the other). However, this difference is possible only with the initial investment assistance that had been provided under RKVY.

Tamil Nadu Agricultural University's Precision Farming Cell & e-extension centre had conducted bench mark and impact study across districts and came out with the following observations:

- Irrespective of the districts, the farmers have accepted and adopted the technology primarily due to the water economy, which in turns helps to expand the area under irrigation, fewer weeds which reduced the cost of cultivation, greater possibility for timely operations and enhanced input use efficiency.
- The productivity increase ranged from 20-150%. On an average, 40-60% yield increase was reported in all the districts.
- Farmers were unanimous in voicing that the era of '*Stressful*' or '*Distress*' agriculture was over as dependency on increasingly scarce labour was minimized, irrigation has become one man affair and the expenses on plant protection chemicals have come down to half, making agriculture profitable.
- Majority of farmers shared their experience on precision farming with fellow farmers on fertigation, marketing problems, soluble fertilizers and plant protection.

- Availing institutional credit to supplement subsidy assistance extended under NADP was the major constraint expressed by the farmers. After sale service from the drip firms continue to be a cause of concern to farmers.
- High costs of water soluble fertilizers are a concern of the majority of the farmers. Most farmers discontinue the use of water soluble fertilizers, as the same is not available at subsidized cost beyond the project.

Success Story of Ameerdeen, Dindigul District

My name is Sultan Ameerdeen, I belong to Velvarkottai village, Vadamadurai block of Dindigul district. I have been a Sugarcane farmer for a long time and decided to take up NADP assisted Precision Farming based on the awareness created by the agriculture department staff. Based on their advice I chose CO-86032 variety and planted 30,000 two budded sets at a row spacing of two and half feet on 5th December, 2008.

Under NADP Precision farming scheme, I had installed drip irrigation system. I was also provided with 55 kg of NPK 19:19:19 water soluble fertilizer, 37.5 kg of MOP, 65kg of Potassium Nitrate and 25 kg of S Potash. I followed fertigation practices as told by the agri department staff. I had a good crop stand. On 18th October, 2009 I harvested 126.75 tonnes that fetched me Rs.1,90,125. The total cost I had incurred until harvest was Rs.53,500 (i.e a profit of Rs.1,36,625/-) as against my previous profit of Rs.91,500 when I followed the conventional method of cultivation. I am happy that I received inputs worth Rs.40,000 through NADP scheme and doubly happy that I made a profit of Rs.45,125 over my previous income. I am now confident from my experience that by practicing precision farming we can obtain higher incomes and profit from any crop.



Broad bed and furrow system with sub-surface drip assembly



Sugarcane sets planted in furrows



Uniform subsurface wetting



A view of subsurface drip assembly



A weedfree, uniform crop stand



Fertigation assembly



A bountiful crop



A farmer shares his success