

## **SUSTAINABLE SUGARCANE INTENSIFICATION IN ORISSA – NIRMAN, 2/10/2011**

### **Profile of Nayagarh District:**

Nayagarh, one of the eastern districts of Orissa, is composed of hilly ranges in the west, and its northeastern parts are comprised of small well-cultivated fertile valleys intersected by small streams. The river Mahanadi flows along the eastern boundary. The rural population constitutes 95% of the total population, and about 62% of the population in the district lives below the poverty line, actually 68% of the rural population.

Agriculture as the main source of income and subsistence for the rural people plays a critical role in the economy of the district and is the source of livelihood for a large majority of its population. Sugarcane is the second most important crop in the district, only behind rice. According to the Agricultural Census 2000-01, nearly 90% of those having land belong to the category of marginal and small farmers, with 62% of the land. The remaining 10% who qualify as medium and large farmers control 38% of the land as operational holdings.

The total workforce in the district is about 2.89 lakh, of which 30% are cultivators and 33% are agricultural labourers.<sup>1</sup> These landless households depend mostly on agriculture. The high proportions of landless, marginal and smallholding households indicate how limited are the district's possibilities for capital investment and sustained economy.

### **Sugarcane in Nayagarh District:**

Sugarcane is the major cash crop grown in Nayagarh. Some farmers grow sugarcane under lease terms. The yield level of the crop has been appreciable, and on earlier occasions some farmers in the district have been awarded with National Prizes for the best yield in the region.

As seen from Table-1, however, the area and production of cane in Nayagarh has been in decline, which is a growing crisis for the people.

Shortage of quality planting materials, high costs of inputs, and distress procurement are some of the major constraints reported that lead to poor performance of the crop. Weather problems add to the difficulties faced by Nayagarh farmers.

**Table-1: Status of Sugarcane in Nayagarh**

Year	Area in 000'ha	Yield in qntl/ha	Production in MT
1995-96	5.87	81,700	479.60
1996-97	4.57	80,000	365.60
1997-98	5.21	80,000	416.80
1998-99	5.22	75,530	394.27
1999-00	3.00	75,730	227.19
2000-01	5.22	76,070	397.09
2001-02	1.99	76,000	151.24
2003-04	3.01	68,590	206.46
2004-05	4.44	62,124	276.26
2005-06	5.16	64,230	331.43
2006-07	5.51	64,235	353.93
2007-08	4.55	63,895	290.72

<sup>1</sup> Agricultural Census 2000-01

## **Reductions in the Cost of Production**

Farmers who produce sugarcane, other than by ratooning, spend a huge amount for seeds, chemical fertilizers, pesticides, and labour, as well as for water. The practices followed lead to detrimental impacts on soil fertility, with less biomass produced and adverse pressure on water sources and on ecosystems. Because sugarcane is a long-duration crop (with a crop cycle more than 9 months), it faces one or more of the vagaries of nature that diminish cane and sucrose productivity.

In the district, farmers spend anywhere from Rs. 33,000 to 38,000 per acre (\$720-830/ha) to produce 28 to 35 tons per acre (70-87 t/ha) making costs about \$10/ha. Marginal, small and landless farmers cannot get loans from the banks or receive any subsidies, incentives or compensation from the Government. Thus, a huge investment in the crop is involved without commensurate yield. Those in economically-vulnerable conditions find themselves either in a never-ending debt trap, or they are led to lease out or sell their piece of land.

Sustainable Sugarcane Initiative (SSI) based on the principles and practices of System of Rice Intensification (SRI) has been introduced to farmers in the region as a solution to the above. SSI extends or extrapolates the ideas and methods of SRI to sugarcane. SSI practices include: bud (seed) treatment (with lime and cow urine); seedling bed preparation on plastic cavity-trays; single bud transplantation; transplantation of young seedlings (25-35 days); wider spacing (2 ft x 4 ft); and organic manure application.

These practices improve the productivity of land and water, produce more healthy canes from less planting material; and give more economic benefits to farmers. Environmental benefits are additional. The mulching of the inter-row space between the sugarcane sets with dried sugarcane leaves conserves surface moisture and controls weeds, also reducing the water loss they contribute to.



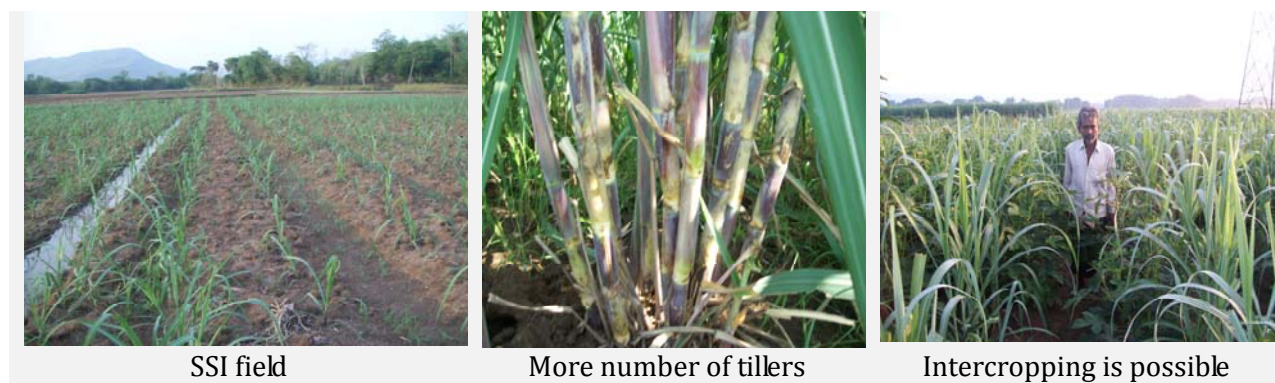
Chopping buds



Seed treatment



Seedling bed



NIRMAN’s work with the sugarcane growers of the district for the last two years has helped clarify our understanding of costs of cultivation (Table-2), as well as of processing and marketing strategies for dealing with their food security.

Particulars	Conventional	SSI
Seed (per acre)	76,800 nodes	5,600-6,500 buds
	Rs 14,400/- (\$ 315)	Rs 1,300/- (\$ 29)
Water	24 hrs/day for 4 days: 8 times in a crop cycle (768 hrs)	8 hrs/day for 3 days: 4 times in a crop cycle (96 hrs)
Labour (including irrigation)	1,190 person-days OR 1,776 hrs in a crop cycle	136 person-days OR 648 hrs in a crop cycle
Cost per acre	Rs 21,244/- (\$ 464)	Rs 7,200/- (\$ 157)
Intercropping	Nil	Possible – as a bonus for farmers

The reduction in production costs is found to be beneficial to debt-bound farmers. It is estimated that by adopting SSI methods, farmers will be able to produce at least 60% more sugarcane while reducing their water inputs by 3 times (or more).

SSI is based on the principle of getting “more with less,” like SRI. Only 5,000 seedlings are required, weighing only 25-30 kg instead of the 5-6 tons of

sugarcane required with conventional methods. Moreover, farmers can crush the cane from which the buds were removed after these are removed with a bud chipper. Making jaggery from the juice is an added economic benefit of SSI.

With conventional methods, farmers must spend up to Rs. 16,000/- (nearly \$ 350) just for planting material. As with SRI, when SSI is adopted, there is about a 90% reduction in seed costs. With lower expenditure, farmers can get more yield. This is achieved also with less water. As there is irregular/deficient rainfall in the Nayagarh district and as sugarcane is the thirstiest crop- after paddy, SSI is a good solution to deal with the water-scarcity problems mentioned above since water is a growing constraint for sugarcane production. The savings in labor are also a major benefit for farmers. Reducing costs by two-thirds is an unprecedented attraction.

### **Learning & Constraints:**

***Spacing in cultivation:*** Initially, farmers refused to adopt the 5 feet spacing between rows. Whatever the size of their piece of land, they did not want to waste any of their space. Gradually we were able to get them to agree to 4 feet spacing, and later, a few farmers experimented with spacing up to 6 feet (in case of demonstration with drip irrigation). Keeping constant all other factors such as variety of sugarcane, land type, soil type, water input, nutrient input, weeding and earthing up, etc., farmers arrived at the findings reported in Table-3, which encouraged an increase in spacing at least to 4 feet:

Spacing	No. of tillers	Length of internodes	Height	Girth (in cm)			Weight
				B	M	T	
6 ft	6	15 cm	315 cm	8	7.5	7	1.7 kg
4 ft	8	10 cm	373 cm	7.5	7.1	6.3	2.1 kg
3 ft	8	7.5 cm	357 cm	7.2	6	5.2	1.9 kg
2 ft	6	5.5 cm	330 cm	6.7	6	4.9	1.7 kg

B-bottom; M-middle; T-top

It was found from farmers that selling self-produced jaggery gives them three times more benefit than supplying their cane to the sugar factory. This has encouraged farmers to run their own processing units for making jaggery, rather than selling to the factory.

Further, the total bagasse available from an acre's production (this is the biomass remaining after cane is crushed to extract the juice) can replace one year's firewood requirement for a five-member family. Ending the family's dependence on fire wood saves as much as Rs. 18,000/- (almost \$400), which further strengthens the household economic position.

A few farmers have begun producing and selling cane buds to sell to other farmers as a sideline business for added income generation. Sugarcane bagasse can also be powdered and mixed with other nutrient supplements to be made into a cattle feed. This contributes to further economic development, improving animal health and production while generating additional income for households that produce feed.

Although Sustainable Sugarcane Initiative requires 50% less water, some minimum of water is of course needed. Some farmers are unable to provide irrigation for her crop during the water-short months of April and May. In the absence of an assured source of irrigation, SSI fields can face up to 40 percent crop loss for lack of water. Finding ways to assure supplementary irrigation as needed remains a constraint for SSI, as of course, it is (even more) for conventional sugarcane growth.

### **Sugarcane in the Orissa Context:**

Orissa, the 8<sup>th</sup> largest State with respect to area and the 11<sup>th</sup> largest in terms of population, occupies 4.74% of India's landmass and accounts for 3.58% of the country's population (2001 Census of India). Agriculture is the mainstay of Orissa's economy, providing livelihood support to more than 80% of population. The agriculture sector contributes nearly 30% of the State's gross domestic product (GDP) and employs over 70% of the work force. Out of the total population, 87% live in rural areas, depending heavily (nearly 73%) on agriculture for employment and sustenance. Marginal and small holders account for 84% of the population.

The State's total cultivable land area is 61.8 lakh hectares of which only 25.2 lakh hectares are under irrigation and 41.4 lakh hectares (around 67%) are only rainfed. All districts in the State have rainfed regions. The distribution of rainfall is very uneven in terms of time and space. Normally, about 60% of the area receives an annual rainfall of no more than 1450 mm. The production potential of these areas is obviously quite limited. In this area of 'changing climate,' most rainfed areas now suffer from droughts in practically every year.

Sugarcane, as a cash crop is cultivated in all 30 districts of the State. However, more than 50% of the crop is produced in the districts of Puri (Nayagarh included), Cuttack, Ganjam, Koraput, Dhenkanal, Bolangir, Kalahandi and Sambalpur. The total area under sugarcane is estimated as 48,000 hectare, contributing 1.17% of the Nation's production. The productivity of sugarcane in the state is 70 MT/hectare as compared to the national productivity of 84 MT/hectare.

The State has had a target of covering at least 150,000 hectares of area under sugarcane during the 11<sup>th</sup> Plan Period (2007-2012). Although the area under cane cultivation is generally around 33,850 hectares, it has ranged from 25,000 hectares during 2002-03 to 38,080 hectares in 2007-08. Production of sugarcane has increased from 1,516,000 MT in 2003-04 to 3,840,000 MT in 2008-09. Production increased by 43% in 2008-09 over 2007-08. Similarly, productivity increased by 13.7% in the same period. There are seven sugar mills in the state, of which six mills are currently in operation. The state produces only 10% of the sugar that it consumes.<sup>2</sup>

Farmers in Orissa are mostly dependent on the monsoon, thus they are very vulnerable to weather variations. Drought has become a recurrent phenomenon in the State. During the 1950s, only three districts were classified as drought-prone. By the 1980s, the whole of western Orissa, consisting of five districts, became drought-prone. During the 1990s, 15 of the 30 districts were considered as drought-prone.

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<sup>2</sup> Nayagarh District Annual Plan 2010-11, District Planning Officer, Nayagarh.

The number of 'usual rainy days' is decreasing. There was poor rain during Kharif-2010, and 17 districts out of 30 were declared as drought-prone, with an average crop loss up to 70%.<sup>3</sup> Rainfall in the midst of winter, i.e. December, also ruined the remaining standing crop.<sup>4</sup> So rainfall can be a liability when there are large fluctuations.

Per capita debt in the state has risen to Rs 9,316 (about \$204).<sup>5</sup> A phenomenon of debt-bound marginal, small and landless farmers committing suicide due to crop loss has gradually emerged in the State. More than 39 farmers ended their lives in Kharif-2010 alone, including two women farmers, and another 28 during the post-harvest period, and more numbers are yet to be counted. All these factors have been contributing to a destabilization of agricultural systems in Orissa, resulting in food crisis and in enhanced hunger-poverty-migration dynamics and in social-economic-environmental imbalance.

So far, no death toll has been reported or seen among sugarcane growers. Generally, a farmer grows sugarcane only on a portion of his or her land along with a staple food crop, usually rice. Although sugarcane often determines the economic status of a farmer, it has functioned as an insurance crop to farmers in the midst of climatic variations. This is especially evident in Nayagarh district where NIRMAN is working with sugarcane growers. In this region last year almost all the 56 farmers working with us have lost up to 75% of their rice crop due to disastrous weather, but they survived with a bumper yield of sugarcane through the Sustainable Sugarcane Initiative (SSI).

NIRMAN's efforts to engage the government bureaucracy and political leadership to get them to understand the significance of these models and to adopt them in public policy. The Orissa Govt. has asked NIRMAN for technical assistance to assist their field functionaries in setting up 50 acres of SSI coverage under RKVY (NADP-National Agriculture Development Programme)-Sugarcane development. In April 2010, NIRMAN released a SSI manual for farmers' use: <http://www.orissadiary.com/ShowDistrictNews.asp?id=17832> Further, for 2011-13, NIRMAN has been proposed by the Directorate of Agriculture, Govt. of Orissa, to draft a proposal for broader sugarcane development through SSI approach. However, the area coverage of various districts is yet to be decided and announced by the authorities.

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<sup>3</sup> As answered by the Agriculture Minister on 10<sup>th</sup> December in Assembly session.

<sup>4</sup> The State received 5 to 93.6 mm rain during 6<sup>th</sup>-10<sup>th</sup> December 2010, leading to huge crop losses, as stated by the Agriculture Minister on 10<sup>th</sup> December in Assembly session.

<sup>5</sup> As answered by the Finance Minister on 6<sup>th</sup> December 2010 in Assembly questionnaire session.