Doubling Farmers' Income in Sugarcane Growing Areas

A case study from Uttar Pradesh

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RADHA MOHAN SINGH

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MINISTER OF AGRICULTURE
& FARMERS WELFARE
GOVERNMENT OF INDIA

13th February, 2019

Message

The Government of India has reoriented the entire farm sector of the country to double the farmers' income by the year 2022. The stakeholders in farm sector should join hands together to contribute their bits towards the ambitious target of doubling farmers' income. To this effect, the technologies developed by ICAR have significantly contributed in enhancing farm productivity, and now continuing ahead with this collaborative programme with industry for making tangible impact in doubling the income of farmers.

I am glad to know that the Indian Institute of Sugarcane Research, Lucknow is implementing a collaborative programme with private sugar group in Uttar Pradesh to double farmers' income. This gives me immense pleasure to note that under this programme, a team of ICAR Scientists at IISR and officials from the Collaborating Partner have made concerted efforts to assess the present farming situations, prioritize interventions and introduce suitable interventions to enhance productivity and income of the farmers. The information presented in this report will serve as a guiding force to the team in their endeavor ahead.

I congratulate the ICAR team of the project, and extend my good wishes for a desired success.

Radha Mohan S.

(Radha Mohan Singh)

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GOVERNMENT OF INDIA

DEPARTMENT OF AGRICULTURAL RESEARCH & EDUCATION

AND

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

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Foreword

The advent of green revolution led to increase in food production by four times and this has resulted into considerable increase in per capita food availability, which made the country not only self-sufficient in food, but also a net food exporting nation. Despite accomplished scenario in agriculture, the income of majority of farmers remained below normal leading to sustained poverty prevailing in the rural area of the country. The consequences were rural migration to look out for other remunerative occupation and sometimes distress. Amidst this unpleasant scenario, agriculture in the country continues to support 58 per cent of population and contributed 17.4 per cent to the GDP during 2016-17.

Several studies conducted during the recent past reported that agrarian distress is increasing owing to low income and inequality in income between agriculture and non-agriculture sectors, which is a matter of great concern. To address this concern Government of India has rolled out programme for "Doubling Farmers' Income" by the year 2022. This ambitious target has enthused and induced motivation among the stakeholders to channelize the resources and efforts in a efficient and holistic manner. In this regard, the Indian Council of Agricultural Research (ICAR) has also taken several initiatives and sensitized Institutes to formulate and implement programme in their mandated agricultural commodity.

I am happy to know that ICAR-Indian Institute of Sugarcane Research, Lucknow has accepted the challenge and initiated a collaborative programme with DCM Shriram Limited, New Delhi in the year 2017 for doubling farmers' income in the command area of four sugar mills in Lakhimpur Kheri and Hardoi districts of Uttar Pradesh. The expert team conducted bench mark survey in the project area, compiled relevant data and came out with this comprehensive report, which highlights the current scenario of farming, population dynamics, land utilization pattern, constraints and income level of farmers derived from bench mark data collected in the project area. All possible and potential interventions in sugarcane as well as in other agricultural enterprises have found a place in this report. The targeted level of yield and income of the farmers to be achieved by the end of year 2020-21 through contribution of various sectors are well presented that makes this report valuable and worthy. I wish the entire project team a smooth sailing and encourage them to work towards desirable targets with positive deliverables within the set time frame.

(T. Mohapatra)

Dated the 12th February, 2019
New Delhi

Acknowledgements

The potential of sugarcane in doubling farmers' income has been well recognized by researchers, planners, policy makers of the country. The potential of the crop was demonstrated by scientists in farmers' fields under several R&D programme being implemented by ICAR-IISR, Lucknow under the guidance of ICAR Head Quarter, especially in the state of Uttar Pradesh. This was the driving force to initiate collaborative programme with DCM Shriram Limited (DSL), New Delhi in public-private-partnership mode to double farmers' income in mill zone areas. This bulletin is an outcome of the preliminary assessment of existing farming systems and blue print of interventions and strategy prepared to enhance farmers' income in the project areas.

We are extremely thankful to Director General, ICAR for his guidance to contemplate and conceive much needed joint venture in PPP mode to double farmers' income in sugarcane growing areas. We extend our heartfelt thanks to Shri R.L. Tamak, President of Sugar Business, DSL for showing faith and confidence on team ICAR-IISR for extending all logical and financial support in implementing this collaborative programme. The team members of DSL Sugar units at Ajbapur, Hariyawan, Loni and Rupapur deserve all applause for their hard work, which actually made it possible to explore and record field level data on farming systems, farmers' income and other parameters to derive meaningful inferences. We also extend our thanks to team of scientists at IISR, Drs. A.K. Sharma, L.S. Gangwar, A.K. Singh (Agronomy), A.K. Singh (Engg.), S.N. Singh, P.K. Singh, J. Singh, M.R. Singh, S.K. Duttamajumder, Radha Jain, Amresh Chandra, Rajesh Kumar, Sukhbir Singh, Barsati Lal, R.S. Dohare, Kamta Prasad and Deeksha Joshi for their intellectual inputs that made this document possible.

We are also thankful to Directors of ICAR-NBFGR and ICAR-CISH, Department of Animal Husbandry, Fisheries of Uttar Pradesh Governement for their kind support. We are grateful to all officers/staff of IISR and sugar mills for their hard work and sincere efforts extended for smooth sailing of the programme. Last but not the least, we are thankful to all those who helped us in getting published this document.

Authors

A.K. Sah, A.D. Pathak, A.K. Jaiswal,
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Chapter 1

Prologue

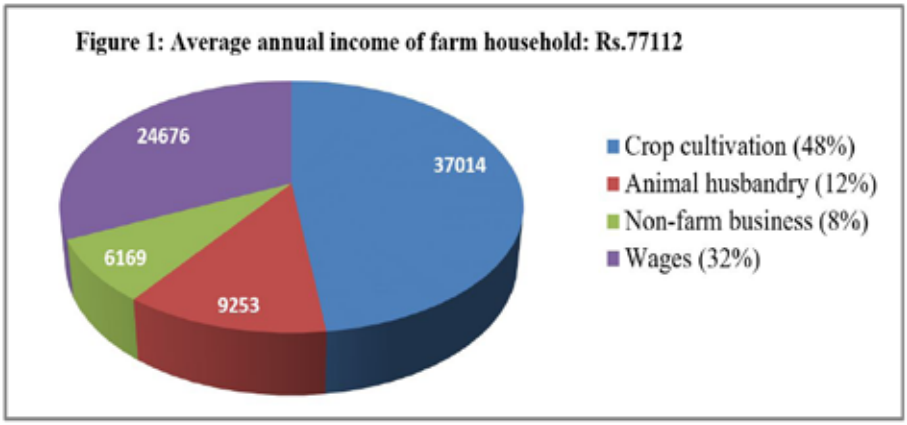
In India, agriculture matters foremost, not least because the farmer holds a special place in Indian hearts and minds. *Shri Mahatma Gandhi Ji* initiated the very first aggressive campaign under *satyagraha* on behalf of farmers to raise collective voice against exploitation of indigo farmers by colonial rule. In independent India also agriculture and farmers remained in focus for every government for social, political and economic reasons. Since independence many agri-development programme with huge budget outlays was formulated and implemented. Epitome among all those was the green revolution in the late 1960s. The unparalleled success was achieved due to advent of green revolution and food production enhanced by 3.7 times during 1965-2015, while population increased by 2.55 times during the same period. This has resulted into 45% increase in per person food production, which made the country not only self-sufficient in food, but also a net food exporting nation. Despite this accomplished scenario in agriculture, the income of majority of farmers did not grow much, and remained low where by rampant poverty prevails in the rural areas.

The development strategy for the agriculture sector in India had focused primarily on raising agricultural output and improving food security. This strategy was central to increase productivity through better technology and varieties, and increased use of quality seed, irrigation and agro chemical. The strategy paid dividends as the country was able to address severe food shortage that emerged during mid 1960s. The strategy did not explicitly recognise the need to raise farmers' income and did not mention any direct measure to promote farmers' welfare. The experience shows that in some case, growth in output brings similar increase in farmers' income but in many cases farmers income did not grow much with increase in output. The net result has been that farmers' income remained low, which is evident from the incidence of poverty among farm households.

According to Situation Assessment Survey of Agricultural Households (SAS) done by NSSO in 2013, the average annual income of a farm household from farm as well as non-farm sources was Rs.77,112 (figure 1). Sixty per cent of total income of agricultural household was derived from farm activities (crop and animals husbandry) and 40 per cent was derived from the non-farm sources (wage, salary, artisan, non-farm business etc.). In absolute terms, crop cultivation generated annual income of Rs.37014 and livestock provided Rs.9253 per agricultural household.

As far as income across size classes is concerned, small farmers derive maximum share from the non-farm sources. As we move up in the size class category, the share of income derived from crop cultivation improves significantly and the share of non-farm activities declines (Birthal *et al*. 2017). This scenario demands differential strategy commensurating to size classes for doubling respective income.

The share of income derived from crop cultivation is relatively higher in Punjab, Haryana, Chattisgarh, Madhya Pradesh, Uttar Pradesh and Uttarakhand. Whereas, the least contribution of crop in farm income is noticed in case of Jammu & Kashmir, Tamil Nadu and West Bengal. The income from Animal husbandry has larger share in Haryana, Gujarat, Odisha, Jharkhand and Andhra Pradesh; while least is observed in Kerala, Chattisgarh, Karnataka and West Bengal.



Disparity in farm and non-farm income

Now it is quite obvious that disparity between farm income and non-farm income is rising (Chand, 2008), the people working outside agriculture are progressing much faster than those who work in agriculture sector. It is also seen that labour in agriculture is becoming more costly and claims considerable share in the net income of farmers. In 1983-84, a cultivator earned three times what a labour earned, while a non-agriculture worker earned three times the income earned by a farmer or his family members engaged in agriculture as their main activity. The disparity in income of a cultivator and a non-agricultural worker increased from 1:3 to 1:4 between 1983-84 and 2004-05 (Chand *et al*., 2015). However, disparity in farm and non-farm income declined to

Table 1: Income earned by agricultural and non-agricultural workers (1983-84 to 2011-12)

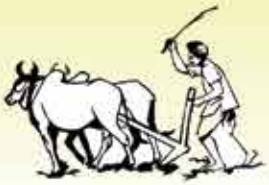
Year	Farm income per cultivator (Rs.)-F	Wage earning per agricultural labour (Rs.)-W	Income per non-agricultural worker (Rs.)-I	Ratio W:F	Ratio I:F
1983-84	4286	1467	12786	0.34	2.98
1987-88	5653	2201	18036	0.39	3.19
1993-94	12365	4784	37763	0.39	3.05
1999-00	24188	8938	78565	0.37	3.25
2004-05	26146	10043	106688	0.38	4.08
2011-12	78264	32311	246514	0.41	3.15

Source: Chand et al. (2015)

1:3.15; and a non-agricultural worker earned 3.15 times the income of a cultivator in 2011-12 (Table 1). This was mainly because of accelerated growth in agricultural output and a decline in the number of cultivators from 2004-05 to 2011-12.

Never the less, agriculture remains of utmost priority for economic reasons, as it still accounts for a substantial part of GDP (16%) and employment (49%). Poor agricultural performance can lead to inflation, farmer distress and unrest, and larger political and social disaffection- all of which can hold back the economy. Moreover, farmers are at the epicentre of the Indian economy and their livelihood upliftment is a must step towards holistic development of the nation. Decline in productivity and income has serious implications on the rural household poverty, and on other economic, social as well as sustainability indicators (Timmer, 1995; Datt and Ravallion, 1998; Mellor, 1999; Fan *et al*., 1999; Minten and Barrett, 2008; Byerlee *et al*. 2009; Muyanga *et al*., 2010). Hence increasing the income of farmers from different sources across holding size and region has become an utmost priority for the policy planners. Though the state goes rhetoric about farmers' welfare since independence, its policies have always been consumer centric preventing the producers from realising the fruits of their labour and hard work (Sendhil et al., 2018).

Realising the need to pay special attention to the plight of farmers the Central Government, in its 2016-17 budget, with the intention of going beyond the food security objective, gave enough policy thrust on income security proposing to double the farmers' income by 2022, the 75th year of Indian independence.



Chapter 2

Incredible Sugarcane Sector

In the ambitious target of doubling farmers' income sugarcane sector can play vital role, as this agro-industrial crop is grown in about 5.0 million hectares, occupying 3% of gross cropped area. About 6 million sugarcane farmers and their dependents, 0.5 million people in sugar mills and a large mass of agricultural labour are involved with sugarcane cultivation, harvesting and ancillary activities. The turnover of the sugarcane and sugar related economic activities is reportedly in the range of Rs. 800-850 thousand millions per annum, out of which, around Rs. 550-600 thousand millions accrues to the sugarcane farmers of the country. At present, the Indian share in global sugar production and consumption is about 15 and 13%, respectively. The current domestic sugar consumption requirement is estimated to be around 24-25 million MT. The sugar industry in India has been instrumental in accelerating the socio-economic development in villages through mobilizing rural resources leading to generation of employment, increase in income and overall improvement in facilities for transport and communication.

The sugar manufacturing activity in the country is spread over among ten states, out of which, five states are in sub-tropical belt (Punjab, Haryana, Uttarakhand, Uttar Pradesh, Bihar) and remaining are in the tropical part (Gujarat, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu). The states of Chhattisgarh and Madhya Pradesh, in Central India as well as Odisha (Eastern India) and the Union Territory of Punducherry (tropical India) also contribute to the domestic sugar production to some extent. Maharashtra and Uttar Pradesh together account for almost 60% of the total sugar produced in India. Last year (2017-18) Uttar Pradesh alone produced about 120 lakh tons sugar, which in itself is a record. Sugarcane yield in the major sugarcane producing states of tropical India is in the range of 70-100 tons/ha, which is higher as compared to that in the sub-tropical regions (50-80 tons/ha). Nevertheless, sugar is an essential item of mass consumption and the cheapest source of energy, supplying around 10% of the daily calorie intake. Apart from sugar, sugarcane also supplements the energy sector through ethanol and bioelectricity production as well.

A large number of sugar factories in India have diversified into by-product based industries and have invested in and set up distilleries, organic chemical plants, paper and particle board factories and cogeneration plants. In all the contribution of sugarcane to the agricultural GDP has steadily increased from about 5% in 1990-1991 to 10% in 2010-2011. As of now, 213 sugar complexes have cogeneration facility to produce 2500 MW equivalent to 30 million tons carbon credit per year. Nearly 133 sugar mills presently have distilleries too. These distilleries have a total capacity of about 2044 million liters per annum. In addition, there are about 172 independent distilleries operating on procured molasses.

Chapter 3

Project Outline

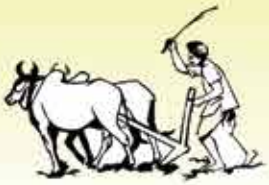
To harness the potential of sugarcane sector towards doubling farmers' income, ICAR-Indian Institute of Sugarcane Research (IISR), Lucknow has signed an Memorandum of Understanding with DCM Shriram Limited (DSL), New Delhi on August 19, 2017 for implementing a joint project in command areas of 4 sugar mills owned by DSL. As per provision of MoU, ICAR-IISR, Lucknow will assess the existing agri-production system and income level of farmers in the project area and accordingly blue print of required interventions in sugarcane based production systems will be prepared, which in due course of time will be introduced in the project area with logistic and financial support of DSL group.

Partners

The Indian Institute of Sugarcane Research, Lucknow being the premier Institute for sugarcane research in the country was established on the 16th February, 1952 by the Indian Central Sugarcane Committee, Govt. of India. The Institute was brought under the governance regime of the Indian Council of Agricultural Research (ICAR) on April 1, 1969. All the important segments of sugarcane research, especially the fundamental aspects, formed the essential items of enquiry and study at this Institute. It was also aimed at coordinating the work in the different subjects as conducted at the regional research stations all over the country, so that recommendations on an all-India basis can be issued forthwith. The IISR, Lucknow conducts research on fundamental and applied aspects of sugarcane and sugarbeet crops covering production and protection techniques, developing high sugar breeding stocks of sugarcane and varieties of sugarcane/sugarbeet, especially for the sub-tropical region, developing linkages with SAUs, Research Centres, cane development department of Uttar Pradesh and other organizations for collaborative research and development in sugarcane sector. For sustained growth of sugarcane sector in the state, the institute provide training, consultancy and advisory services to farmers and industries.

During the past six-and-half decades, the research carried out at the Institute was focused on development of technologies pertaining to varietal development, enhanced germination, quality of seed cane, methods of planting, synchronous tillering, integrated nutrient and weed management, soil health management, water management, crop diversification, ratoon management, development of sugarbeet varieties, mechanization of sugarcane cultivation, post-harvest management, integrated disease and pest management, entrepreneurship development and human resource development etc.

DCM Shriram Ltd., New Delhi is a leading business conglomerate with a group turnover of Rs. 7,063 crores. The business portfolio of DCM Shriram comprises primarily of Agri-



Rural Business (Urea & SSP fertilizers, Sugar, Farm inputs marketing such as DAP, Crop care Chemicals, Hybrid Seeds), Chlor-Vinyl Business (Caustic Soda, Chlorine,Calcium Carbide, PVC resins, PVC Compounds, Power and Cement) and Value added business (Fenesta Building Systems- UPVC Windows & Doors). The DCM Shriram, a spin-off from trifurcation of the reputed erstwhile DCM Group in 1990, is managed by Mr. Ajay S. Shriram, Chairman & Senior Managing Director, Mr. Vikram S. Shriram, Vice Chairman & Managing Director and Mr Ajit. S. Shriram, Joint Managing Director along with a highly professional executive team. In addition, the DCM Shriram has manufacturing facilities of Fertiliser, Chloro Vinyl & Cement in Kota (Rajasthan) and of Chlor- Alkali in Bharuch (Gujrat). The company operates coal-based captive power, facilities - in Kota and Bharuch (Gujrat). The urea plant in Kota has a Production capacity of 379,000 TPA & Chlor- Alkali capacity of 5,07,000 TPA in both Kota & Bharuch.

Business strategy

DCM Shriram, across its various businesses is strategically diversified, yet operationally integrated at a high level. Some of the business avenues feed others, thereby lowering operation costs and making DCM Shriram a highly competitive player.

DCM Shriram has been working in the agriculture sector with a vision to increase productivity and profitability of the farmers through its various business ventures: Farm Solutions, Bioseed (Hybrid Seeds), DSCL Sugar. DCM Shriram aims to achieve its vision by adding value to farmers through its large farm extension programmes and last mile delivery activities.

Sugar Business

DSCL Sugar, entered the sugar business in 1997 with its first sugar manufacturing unit at Ajbapur in Lakhimpur Kheri District, followed by other manufacturing units at Rupapur, Hariawan and Loni, in Hardoi District of Uttar Pradesh. The production facilities have co-generation power plants with an installed co-generation capacity of 149 MW, out of which, the group supply some renewable energy to the national grid as well and the rest is for captive use. Each of these units has invested in state-of-the-art technology that gives one of the best manufacturing efficiencies in the country. DCM Shriram lay major emphasis on regular interaction with approximately 1.5 lakh farmers for the development of cane quality in cane command area. At present, the DSCL sugar have an installed capacity of 38,000 TCD (tonnes crushed of sugarcane daily), crushing around 4 million tons of cane from four manufacturing units. It is also supported by a 150 KLD Distillery at Hariawan Unit.

To harness the potential of sugarcane sector towards doubling farmers' income, ICAR-IISR is implementing a joint project in Public Private Partnership mode in command areas of 4 sugar mills owned by DCM Shriram Limited (DSL), New Delhi. As per provision of MoU, ICAR-IISR, Lucknow assessed the existing agri-production system and income level of farmers in the

project area and accordingly blue print of required interventions (sugarcane based and in allied agri-enterprises) was prepared, which are being introduced in the project area with logistic and financial support of DSL group.

The highlights of the MoU are as follows:

1. Project implementation in 4 sugar mills namely; DSCL, Ajbapur (District Lakhimpur Kheri), DSCL, Rupapur, DSCL, Hariyawan and DSCL, Loni (all in District Hardoi) of Uttar Pradesh.
2. Selection of 2 villages from each of sugar mill, the benchmark survey to collect basic information for assessing present agri-production scenario and income in total of 8 villages.
3. Prepare check list of interventions required in sugarcane production system specifically and in agri-production system as a whole, which can generate employment for village dwellers and enhance income of farmers in shortest possible time.
4. Mid-way assessment of impact derived of introduced interventions (after 2 years of project initiation *i.e.* in 2019).
5. Re-orient and establish intervention based model farm in farmers' fields in adopted villages.
6. Dissemination of information on positive impact of established model to neighbouring or other villages in command areas of sugar mill through model farm approach.
7. Final assessment of impact especially in terms of increase in farmers' income by the years 2020-21.

In the light of above mentioned, four teams of social scientists was constituted and deployed to conduct benchmark surveys in 8 selected villages. The data was collected through pre-structured schedule, compiled and discussed with expert group of scientists of biological sciences & engineering. The list of suitable intervention was decided and it was agreed to introduce interventions in the adopted villages with all logical and financial support from the DSL.

Team of Social Scientists:

Sl. No.	Scientists	Sugar Factories
1.	Dr A.K. Sah, Principal Scientist (Agricultural Extension) Dr. L.S. Gangwar, Principal Scientist (Agricultural Economics)	DSCL Sugar- Ajbapur, District- Lakhimpur Kheri
2.	Dr. R.S. Dohre, Principal Scientist (Agricultural Extension) Dr. L.S. Gangwar, Principal Scientist (Agricultural Economics)	DSCL Sugar-Rupapur, District- Hardoi
3.	Dr. Kamta Prasad, Scientist (Agricultural Extension) Dr. A.K. Sharma, Principal Scientist (Agricultural Economics)	DSCL Sugar-Hariawan, District- Hardoi
4.	Dr. Barsati Lal, Principal Scientist (Agricultural Extension) Dr. A.K. Sharma, Principal Scientist (Agricultural Economics)	DSCL Sugar- Loni, District- Hardoi

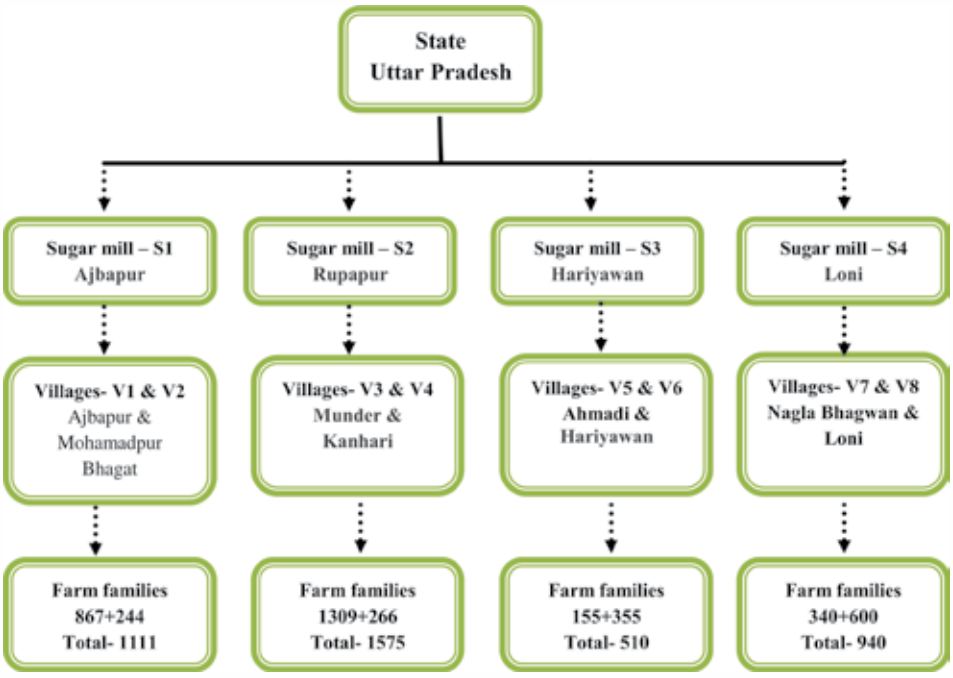
Other scientists associated with this are as follows:

Sl. No.	Discipline	Scientists
1.	Agronomy	Dr. S.N. Singh and Dr. A.K. Singh, Principal Scientists
2.	Plant Breeding	Dr. P.K. Singh and Dr. J. Singh, Principal Scientists
3.	Crop Protection	Dr. M.R. Singh and Dr. S.K. Duttamajumder, Principal Scientists Dr. Deeksha Joshi, Senior Scientist
4.	Agricultural Engineering	Dr. A.K. Singh, Principal Scientist; Dr. Sukhbir Singh, Senior Scientist
5.	Plant Physiology	Dr. Radha Jain and Dr. Amresh Chandra, Principal Scientists
6.	Agricultural Statistics	Dr. Rajesh Kumar, Principal Scientist

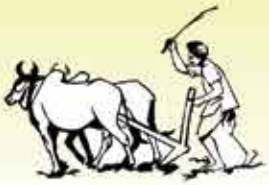
Dr. A.K. Jaiswal, Principal Scientist, Crop Protection coordinates the programme. The year 2016-2017 was considered for bench-marking baseline information. The identified technological interventions were planting techniques, balanced fertilizer, integrated pest and disease management, and other practices, as and when required, not for sugarcane only but for other crops in the area as well.

Sampling and Data Collection

Figure 2: Sampling plan



For conducting the bench mark survey in selected villages, pilot survey schedule was prepared by the Social Scientists involved in the project. A pilot survey was conducted in the selected villages in the last quarter of the year 2017, and accordingly the final survey schedule was developed. Complete enumerated data of selected villages was collected by extension/ cane development personnel of the sugar mills in the first quarter of the year 2019 by executing survey schedule through personal interview mode. The collected data was compiled, collated and analysed to have deeper insights into existing farming conditions and also the present level of farm income in the villages. On the basis of information generated on actual farming situation and farm income, interventions related to sugarcane-based system, other cropping/farming systems have been listed, prioritised and introduced in the year 2018.



Chapter 4

Overview of the Project Area

The collaborative programme is being implemented in Uttar Pradesh, the largest sugarcane growing state of the country. The two important cane growing districts in the state i.e. Lakhimpur Kheri and Hardoi was selected as all the four sugar units of the collaborating industrial partener - DCM Shriram Limited is situated in these districts. The sugar mills of DCM Shriram Limited are ; (i) Ajbapur (Lakhimpur), (ii) Rupapur, (iii) Hariyawan and (iv) Loni (Hardoi). Two villages were selected as representative sampling unit of the project area from each of the four sugar will area.

DSL(UP) ➡ 2 districts ➡ 4 sugar mills ➡ 8 villages ➡ 4136 farm families ➡ 2089 ha cultivation

Uttar Pradesh is the rainbow land where the multi-hued Indian Culture has blossomed from times immemorial. Rich and tranquil meadows, perennial rivers, dense forests and fertile soil of Uttar Pradesh dotted with various holy shrines and piligrim places, full of joyous festivals, the state plays an important role in Indian politics, education, culture, industry, and most importantly agriculture.

Garlanded by the Ganga and Yamuna, the two pious rivers of Indian mythology, Uttar Pradesh is surrounded by Bihar in the East, Madhya Pradesh in the South, Rajasthan, Delhi, Himachal Pradesh and Haryana in the west and Uttaranchal in the north and Nepal touch the northern borders of Uttar Pradesh, it assumes strategic importance for Indian defence. Its area of 2,36,286 km^2 lies between latitude of 24 to 31 degree N and longitude of 77 to 84 degree East. Area wise it is the fourth largest State of India. With total population of about 22 crores, as much as 16-17% of India's population lives in the state.

The Gross State Domestic Product (GSDP) of Uttar Pradesh grew at a CAGR of around 11.29 per cent between 2011-12 and 2017-18 to reach Rs 13.76 lakh crore (US$ 213.44 billion). The Net State Domestic Product (NSDP) grew at a CAGR of around 11.24 per cent between 2011-12 and 2017-18 to reach Rs 12.22 lakh crore (US$ 189.62 billion). The economy of Uttar Pradesh is the fourth-largest state economy in India with Rs 14.89 lakh crore in gross domestic product and a per capita GDP of Rs 55,000. Agriculture and service industries are the largest parts of the state's economy.

Uttar Pradesh has a humid subtropical climate and experiences four seasons. The winter in December, January and February is followed by summer between March and June and the monsoon season between June-July and September. Summers are extreme with temperatures fluctuating anywhere between 35 °C and 45 °C in parts of the state coupled with dry hot winds called the *Loo.* The Gangetic plain varies from semiarid to sub-humid.

The mean annual rainfall ranges from 650 mm in the southwest corner of the state to 1000 mm in the eastern and south-eastern parts of the state. Primarily a summer phenomenon,

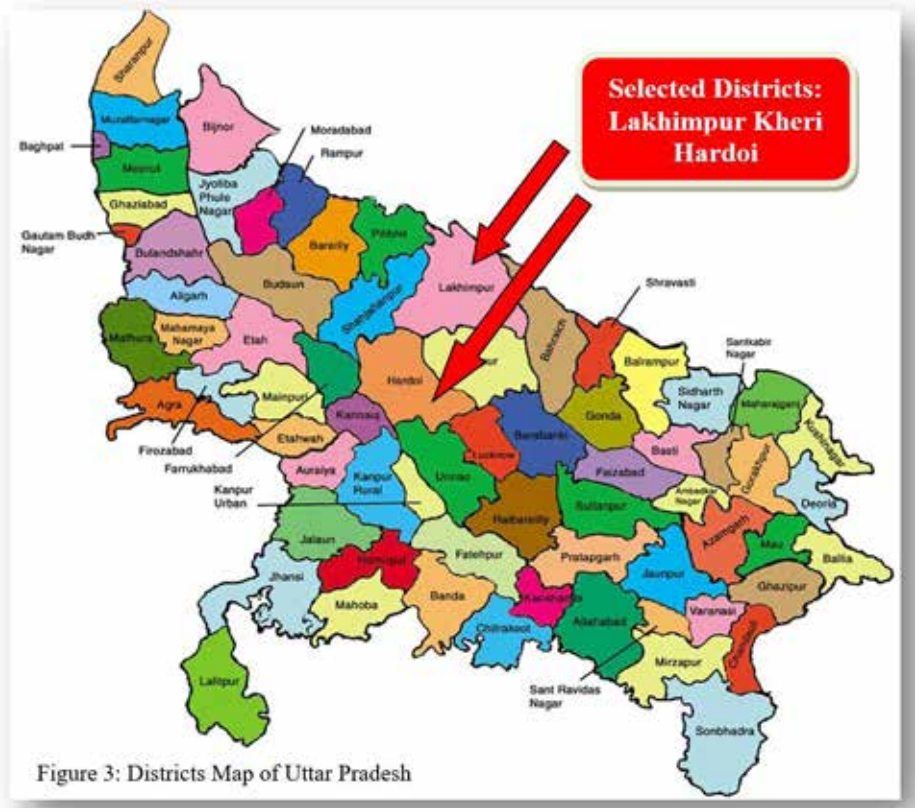
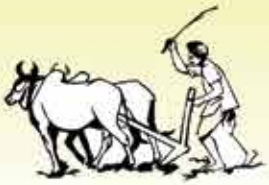


Figure 3: Districts Map of Uttar Pradesh

Table 2: Facts and figures related to agriculture in Uttar Pradesh

Farm workers of total work force	66%
Net sown area (in hectares)	16564
Total sown area (in hectares)	25821
Food grains production (in thousand metric tonne)	51253 (2017-18)
Pulse production(in thousand metric tonne)	2208 (2017-18)
Oil seeds production (in thousand metric tonne)	1005
Sugarcane production (in thousand metric tonne)	134846 (2017-18)
Vegetables production (in thousand metric tonne)	11678 (2015-16)
Potato production (in thousand metric tonne)	13832 (2015-16)
Net irrigated areas (in thousand hectare)	13809 (2013-14)
Gross irrigated areas (in thousand hectare)	20191 (2013-14)
Total created irrigation potential (in thousand hectare)	25902 (2013-14)
Total utilized area of irrigation potential (in thousand hectare)	24403 (2013-14)



the Bay of Bengal branch of the Indian monsoon is the major bearer of rain in most parts of state. After summer it is the south-west monsoon which brings most of the rain here, while in winters rain due to the western disturbances and north-east monsoon also contribute small quantities towards the overall precipitation of the state.

Sugarcane in the State

Sugarcane farming and sugar mills are the pivot of the state's economy and development, as it is the highest producer of sugarcane in India. The average cane yield is about 79.2 t/ha and average sugar recovery is 10.86% in the year 2017-18. In the year 2017-18 the total are under cane cultivation was about 23 lakh hectares producing a total of 182 million tonne cane, a total of 118 sugar mills crushed 1104.06 lakh tonne of cane and about 120 lakh tonne sugar was produced. Payment of Rs. 33588.49 crore against the total amount of Rs. 35463.68 crore payable to farmer has been made for the crushing season 2017-18 upto January 2019.

Lakhimpur Kheri District

Lakhimpur Kheri is the largest district (7680 km^2) in Uttar Pradesh, bordering with Nepal. Its administrative capital is the city of Lakhimpur. Dudhwa National Park is in the Lakhimpur Kheri and is the only national park in Uttar Pradesh. It is home to a large number of rare and endangered species including tigers, leopards, swamp deer, hispid hares and Bengal florican. The district is within the Terai lowlands at the base of the Himalayas, with several rivers and lush green vegetation. Situated between 27.6 and 28.6 degree N latitude and 80.34 and 81.30 degree E longitudes, it is roughly triangular in shape, the flattened apex pointing north. Lakhimpur Kheri is bounded on the north by the river Mohan, separating it from Nepal; on the east by the Kauriala river, separating it from Bahraich; on the south by Sitapur and Hardoi; and on the west by Pilibhit and Shahjahanpur.

The climate is generally hot throughout the year except the rainy season. During summer (March to June), the temperature can reach above 40°C and in winters (October to February) it can drop to around 4°C. The nights are very cold during winter and fog is very common in this season. The annual average rainfall in Lakhimpur Kheri is 1,500.3 millimetres, mostly in the monsoon months (July to September). Several rivers flow across Lakhimpur. Some of these are Sharda, Ghagra, Koriyala, Ull, Sarayan, Chauka, Gomti, Kathana, Sarayu and Mohana.

Sugarcane, wheat, rice, maize, barley, and pulses are the major food crops. Sugar-cane and oilseeds are the chief non-food crops. Sugarcane is grown and processed in this district, forming the backbone of the local economy.

The district comprises 2 Parliamentary Constituencies– Kheri, and Dhaurahra; 8 Assembly Constituencies – Lakhimpur, Dhaurahara, Gola Gokarannath, Kasta, Mohammadi, Nighasan, Palia Kalan, Srinagar; 6 Tehsils – Lakhimpur, Mohammdi, Gola Gokarannath, Nighasan, Dhaurahra, Mitauli Palia Kalan; 15 blocks – Lakhimpur, Behjam, Mitauli, Pasgawan, Mohammdi, Gola

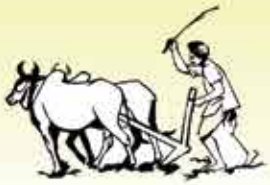
Gokarannath, Bankeyganj, Bijuwa, Paliya, Nighasan, Ramiyabehar, Issanagar, Dhaurahara, Nakaha, Phoolbehar; 4 Nagar Palikas – Lakhimpur, Gola Gokarannath, Mohammadi, Palia Kalan; 6 Town Areas – Kheri, Oel, Mailani, Barbar, Singahi, Dhaurahara; 2 Judicial Court Complexes - District and Sessions Courts at Lakhimpur and Sub-Divisional/Civil Courts at Mohammadi.

Hardoi District

Hardoi district comes under Lucknow Commissionaire in Uttar Pradesh Province of India. It is situated in between $26^0 53'$ to $27^0 46'$ North Latitude and $79^0 41'$ to $80^0 46'$ East Longitude. Its north border touches Shahjahanpur & Lakhimpur Kheri districts, Lucknow the capital of UP and Unnao are situated at south border, West borders touches Kanpur (Industrial City of UP) and Farrukhabad and on eastern border Gomati river separates the district from Sitapur. Nemisharayan, the Pilgrim of Dwapar age is just 45 km away from district headquarter. The length of this district from northwest to southeast is 125.529 km and width from east to west is 74.83 km. District Hardoi comprises of 5 tehsils (Hardoi, Shahabad, Bilgram, Sandila and Sawayajpur), 19 blocks, 191 Nyay Panchayat, 1101 Gram Sabha and 1901 habited revenue villages. It also has 7 Nagar Palika Parishads and 6 Nagar Panchayats. Geographical area is 5947 km^2. As per census 2011 population of the district is 4091380, out of which, female are 1887116 and male population being 2204264.

The climate here is mild, and generally warm and temperate. Hardoi has a significant amount of rainfall during the year. This is true even for the driest month. The average annual temperature in Hardoi is 25.3°C. In a year, the average rainfall is 1103 mm. Paddy-wheat, Maize-Wheat, Maize-potato, rice-mustard, Maize-potato-vegetable, groundnut-barley-vegetable are major cropping sequence in the district. Sugarcane is grown as the main cash crop and area under this crop has been increasing during recent years. Garlic, onion, vegetable pea for green pods and watermelon, cucumber and cucurbits are the component of farming system which providing greater net returns.

Figure 4: Maps of Lakhimpur Kheri and Hardoi districts



Chapter 5

Population and Land Holding Characteristics

The total population dwelling in all selected eight villages is 39653, out of which male and female population are 17477 (44.07%) and 22176 (55.93%), respectively. The total number of farm families is 4136, comprising 61.41 per cent and 38.59 per cent of joint and nuclear family, respectively. Despite family disintegration amidst urbanisation, the larger percentage of joint families in project area is a good indication for farming. The average number of farm families per village is 517 (ranging between 155-1309). However, 93.76% are small and marginal farmers (having cultivable land less than 2 ha) and 6.24% are large farmers (having more than 2 ha cultivable land), indicating fragmentation of holdings in large numbers and somehow resource poor farming condition. Landless farm families are 645, which is 15.59 per cent of total farm families. As far as categorisation of families on the basis of caste is concerned, majority of family i.e. 44.30 per cent belongs to other backward class followed by general category (34.16%), schedule caste (21.47%) and schedule tribe (0.07%) (Table 3).

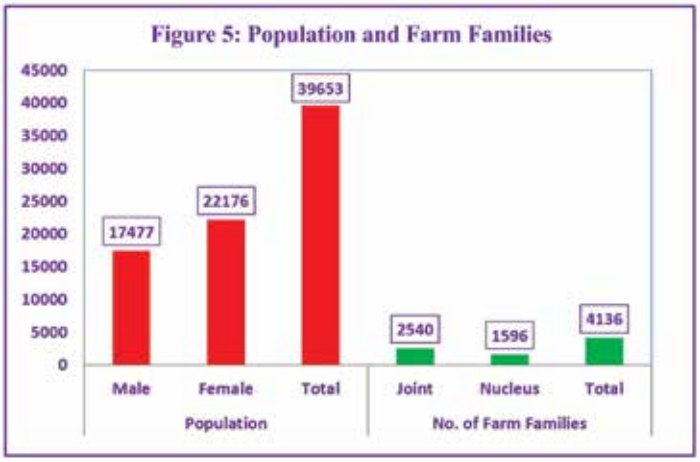
Table 3: Population and land holding characteristics of farmers

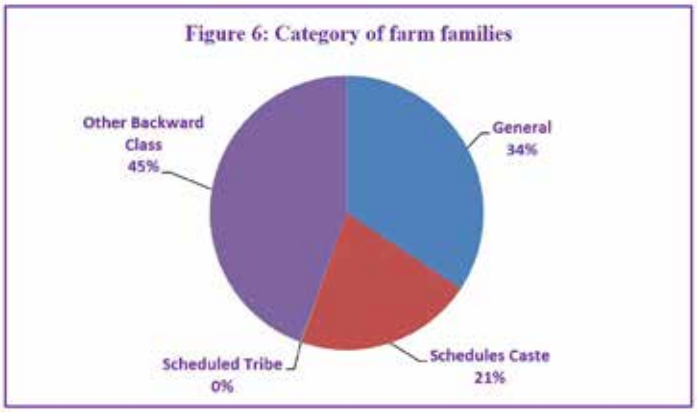
S. No.	Village	Population			No. of Farm Families	Type of Families		Size of farm holdings (ha.) %		Category of Farm Families (%)			
		Male	Female	Total		Joint	Nucleus	< 2 ha	> 2 ha	General	SC	ST	OBC
1	Ajbapur	1372	1281	2653	867	76	791	384	23	160	256	0	451
2	Mohd. Bhagat	550	470	1020	244	227	17	106	63	84	52	0	109
3	Munder	4655	4325	8980	1309	1297	12	1295	14	360	207	0	742
4	Kanhari	2200	1000	3200	266	165	101	258	8	153	30	0	90
5	Ahmadi	1000	9000	10000	155	50	105	150	5	15	70	3	77
6	Hariyawan	2500	1500	4000	355	190	165	290	35	260	60	0	17
7	Nagla Bhagwan	2000	1800	3800	340	320	20	245	15	181	113	0	46
8	Loni	3200	2800	6000	600	215	385	545	55	200	100	0	300
	Total	17477 (44.0)	22176 (55.9)	39653 (100)	4136 (100)	2540 (61.41)	1596 (39.59)	3273 (93.76)	218 (6.24)	1413 (34.16)	888 (21.47)	3 (0.07)	1832 (44.30)

Note: Figures in parentheses are in per cent

The soil in the villages are mostly loam, clay loam and sandy loam, providing good opportunity for cultivation of cereals, pulses, vegetable, sugarcane and other remunerative crops. However, soil carbon status, the major factor of soil fertility, in all eight villages ranges between low to medium. This is not good indication for sustaining high yield of crop in the long run,

and this requires an integrated approach for improving soil carbon level through crop rotation, green/organic manuring, organic farming etc. The eight villages' covers a total geographical area of 2322 hectares, out of which 2090 ha is under cultivation (90.01%), and the rest i.e. 232 ha was being occupied under houses, ponds, schools, panchayats, paths, etc. The cultivated area in villages varies from 112 to 619 ha with an average of 261.25 ha per village. Out of total cultivable land 96.32 per cent i.e. 2013 ha is irrigated land, followed by 2.15 and 1.53 per cents un-irrigated and forest/pasture land, respectively (Table 4).





However, major source of irrigation is diesel pumpset owned by the farmers in seven villages, whereas in one village i.e. Ahmadi under Hariyawan sugar mill, 60 per cent of the irrigated land recievs water from canal (Table 5). This shows poor community irrigation infrastructure provision in the study area, and this demand policy and investment commitment by the government departments to provide larger access of cultivable area to the canal water. Rampant use of farmers' owned pump sets led to depletion of ground water, thus surfacing the problem like salinity.

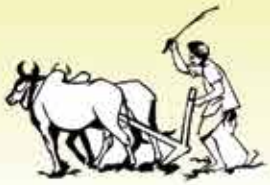


Table 4: Agro-ecological characteristics of the villages

Sl	Village	Geographical area (ha)	Cultivable land (ha)	Irrigated (ha)	Un-irrigated (ha)	Forest/ pasture (ha)	Soil Type	Soil Carbon status
1	Ajbapur	380	292	235	27	30	Clay and loam	Low to medium
2	Mohd Bhagat	147	132	127	5	-	Clay and loam	Low to medium
3	Munder	655	619	610	8	-	Clay loam	Low to medium
4	Kanhari	247	212	206	6	2	Clay loam	Low to medium
5	Ahmadi	130	120	120	Nil	Nil	Clay loam and Sandy loam	Low to medium
6	Hariyawan	428	408	408	Nil	Nil	Clay loam and Sandy loam	Low to medium
7	Nagla Bhagwan	125	112	112	Nil	Nil	Clay loam and Sandy loam	Low to medium
8	Loni	210	195	195	Nil	Nil	Clay loam and Sandy loam	Low to medium
	Total	2322	2090	2013	46	32		

Table 5: Source of Irrigation water

Sl	Village	Total irrigated area (ha)	Source of irrigation water use (%)		Soil and Land Features
			Canal & others	Pump sets	
1	Ajbapur	235	5	95	Waterlogged 10% area, loam soil
2	Mohd. Bhagat	127	50	50	Clay loam
3	Munder	610	6	94	Sandy Loam and 1% User Land
4	Kanhari	206	10	90	Sandy , Sandy Loam and Clay Loam
5	Ahmadi	120	60	40	Waterlogged 50% area, sandy loam soil
6	Hariyawan	408	0	100	Clay loam
7	Nagla Bhagwan	112	0	100	Clay loam
8	Loni	195	0	100	Clay loam
	Total	2013			

Chapter 6

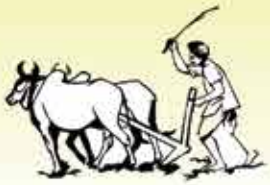
Availability of Agri Implements and Machines

The quantity of farm implements and machines in a geographical area gives the picture of extent of mechanisation in agriculture/farming. Mechanisation can be understood as the art of using machineries and tools to hasten production, accomplish task, saving human labour and reduce human drudgery in order to produce better quality food in cost effective manner. In other words, agricultural mechanisation is the application of machineries, equipment and implements in the day to day farm activities to increase food production. The assessment of agricultural implements revealed that large numbers of implements and machines of agricultural use (1013) are available in the villages. With this number of farm implements and machines we can say that extent of mechanisation of farming in project area is good. Tilling and plough are important field operations need to be performed for raising good crops, for these farm operations a total of 191 tractors, 160 cultivators, 129 harrows, 8 rotavators and 4 MB plough are available in the villages (Table 6). For sugarcane farming implements like trench opener (8), Ratoon Management Device (2), ridger (51) are also available with the farmers in the villages. In addition, 222 large sprayer, 62 thresher and 176 trollies (Table 6) available in the villages also contribute in effective execution of farm operations like agri-chemical application, separating grains from straw/chaff, transportation of inputs and farm produce etc.

Table 6: Status of Implements and Machinery Use

S. No.	Village	Tractor	Trollies	Culti-vator	Rota-vator	Harrow	MB Plow	Trench Opener	RMD	Ridger	Thresher	Sprayer Large
1	Ajbapur	41	12	35	1	30	0	0	0	20	4	0
2	Moh. Bhagat	12	5	10	0	12	1	0	0	12	3	1
3	Munder	29	29	29	3	24	0	0	0	11	21	0
4	Kanhari	10	10	10	2	8	0	0	0	7	10	0
5	Ahmadi	8	8	8		8	0	1	0	1	0	0
6	Hariyawan	50	70	50	2	40	2	2	0	0	20	101
7	Nagla Bhagwan	18	19	18	0	7	1	2	0	0	5	20
8	Loni	23	23	0	0	0	0	3	2	0	3	100
	Total	191	176	160	8	129	4	8	2	51	62	222

The machines related to cane cultivation like sugarcane cutter planter, trench planter, raised bed seeder (RBS) cum planter are not available in the villages. This indicates poor mechanisation of farm operations in cane cultivation.



Chapter 7

Crops Grown and Sugarcane Cultivation Status

Out of the eight villages four villages namely; Ajbapur, Ahmadi, Nagla Bhagwan and Loni are sugarcane intensive villages with the extent of sugarcane cultivation of 79.45, 95.00, 91.96 and 82.56 per cents, respectively (Table 8). In the other four villages, sugarcane coverage was 59.85, 56.37, 36.26 and 11.63 per cents. The total cane area in the villages varies between 72-232 ha (Table 7), and sugarcane is being cultivated in total of 1070 ha land in all eight villages, which comes to 133.75 ha per village (Table 8). Co0238 is major sugarcane variety grown there, while the other cane varieties like Co0118, CoLk 94184, Co 98014, Co08272, CoSe95422, Co 05011, CoS 767, CoJ 88, CoS 8436, CoSe 98231, CoS 96264 are also being cultivated in the villages (Table 7). In all the villages, maximum area is under spring and ratoon cane, the share of autumn cane is very less. The total area under spring, ratoon and autumn cane is being 56.25, 58.37 and 9.625 per cents, respectively; however, 9.5 per cent cane area was reported under the late planted cane (Table 8).

With average net cultivated area (NCA) of 264 ha per village, the total net cultivated area reported is 2090 ha. The total gross cropped area is 3735 ha with average of 466.88 ha per village (Table 8). The cane yield range between 43 to 62.5 t/ha, however average cane yield of all eight villages is 54.78 t/ha. Very few farmers are growing intercrops with sugarcane; however, maximum intensity of intercropping was reported from Kanhari village where it was 35.33 percent (Table 8).

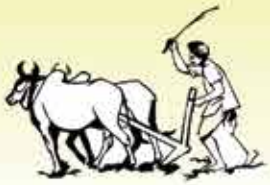
Table 7: Details of sugarcane crop in selected villages

Village	Season	Area (ha)	Yield (q/ha)	Varieties
Ajbapur	Autumn	1	750	Co 0238, Co 0118, Co 767, CoJ 88
	Spring	119	600	
	Ratoon	112	525	
Total cane area & average yield		232	625	
Moh. Bhagat	Autumn	1	625	Co 0238, Co 0118, Co 767, Co 98014
	Spring	40	625	
	Ratoon	38	490	
Total cane area & average yield		79	580	
Munder	Autumn	10	600	Co 0238, Co 767, CoLk 94184, CoS 8436, CoSe 98231, CoS 97264, CoJ 88
	Spring	38	600	
	Ratoon	24	450	
Total cane area & average yield		72	550	
Kanhari	Autumn	15	600	Co 0238, Co 767, CoLk 94184, CoS 8436, CoSe 98231, CoS 97264, CoJ 88
	Spring	32	600	
	Ratoon	32	500	
Total cane area & average yield		79	567	

Ahmadi	Autumn	4	650	Co 0238, CoS 08272, Co 0118, CoLk 94184, Co Se 95422
	Spring	60	600	
	Ratoon	50	490	
Total cane area & average yield		114	580	
Hariawan	Autumn	40	700	Co 0238, Co Lk 94184, Co 0118, Co 05011 Co 0238
	Spring	80	650	
	Ratoon	100	550	
	Late	10	450	
Total cane area & average yield		230	550	
Nagla Bhagwan	Autumn	3	650	Co 0238, Co0118, CoLk94184
	Spring	20	600	
	Ratoon	50	500	
	Late	30	400	
Total cane area & average yield		103	500	
Loni	Autumn	3	700	Co 0238, CoLK 94184, Co0118, Co98014
	Spring	61	500	
	Ratoon	61	440	
	Late	36	350	
Total cane area & average yield		161	430	
Grand Total (cane area and average cane yield)		**1070**	**547.71**	
Average cane area per village		133.75		

Table 8: Nature and Extent of Sugarcane Cultivation and Intercropping

Village	NCA (ha)	GCA (ha)	Extent of sugarcane (%)	Total Sugarcane area (ha)	Sugarcane area under different season (ha)				Intensity of inter cropping (%)	Av. Cane Yield (t/ha)
					Autumn	Spring	Late planted	Ratoon		
Ahmadi	120	205	95.00	114	4	60	0	50	15.38	58.00
Hariyawan	408	744	56.37	230	40	80	10	100	17.39	55.00
Nagla Bhagwan	112	235	91.96	103	3	20	30	50	4.76	50.00
Loni	195	363	82.56	161	3	61	36	61	2.00	43.00
Ajbapur	292	380	79.45	232	1	119	0	112	2.00	62.50
Mohd. Bhagat	132	147	59.85	79	1	40	0	38	0.00	58.00
Munder	619	1203	11.63	72	10	38	0	24	26.95	55.00
Kanhari	212	458	37.26	79	15	32	0	32	35.33	56.70
Total	**2090**	**3735**		**1070**	**77**	**450**	**76**	**467**	**103.67**	**54.78**
Average	**264**	**466.88**	**51.20**	**133.75**	**9.625**	**56.25**	**9.5**	**58.37**	**13**	



Other crops grown in the villages include paddy, wheat, maize, potato, mustard, urd, lentil, sesame and groundnut with varying area in the villages (Tables 9a and 9b). Large variations in the productivity of different crops are being reported as evident from table 10. The cropping intensity was maximum in Kanhari (216.04%) and minimum was in Mohd. Bhagat (111.36%) (Table 10).

Table 9 a: Important crops grown by the farmers in sugarcane based cropping system

Sl. No.	Crops	Ajbapur		M. Bhagat		Munder		Kanhari	
		Area (ha)	Per cent	Area (ha)	Per cent	Area (ha)	Per cent	Area (ha)	Per cent
1	Paddy	3	1.03	4	3.03	90.00	14.54	6.28	2.96
2	Wheat	5	1.71	6	4.54	230.00	37.16	105	49.53
3	Maize	0	0	0	0	70.00	11.31	10.10	4.76
4	Urd	0	1.71	0	0	20.00	3.23	6.80	3.21
5	Lentil	0	0	0	0	0	0	0	0.0
6	Sesame	2	0.68	1	0.76	70.00	11.31	0	0
7	Groundnut	0	0	0	0	10.00	1.62	0	0
8	Mustard	6	2.05	4	3.03	32.00	5.17	8.00	3.77
9	Potato	1.5	0.51	0	0	20.00	3.23	5.00	2.36
10	**Sugarcane**	**232**	**79.45**	**79**	**59.85**	**72**	**11.63**	**79**	**37.26**
	Total	254.5	100	94	100	870.37	99.99	288.45	100

Table 9 b: Important crops grown by the farmers in sugarcane based cropping system

Sl. No.	Crops	Ahmadi		Hariyawan		Nagla Bhagwan		Loni	
		Area (ha)	Per cent	Area (ha)	Per cent	Area (ha)	Per cent	Area (ha)	Per cent
1	Paddy	2	1.67	15	3.68	4	3.57	3	1.5
2	Wheat	2	1.67	36	8.82	3	2.68	25	12.82
3	Maize	0	0	0	0	0	0	0	0
4	Urd	0	0	36	8.82	0	0	0	0
5	Lentil	0	0	20	4.90	0	0	2	1.02
6	Sesame	0	0	34	8.33	1	0.89	2	1.02
7	Groundnut	0	0	0	0	0	0	0	0
8	Mustard	2	1.67	34	8.33	0	0	0	0
9	Potato	0	0	3	0.74	1	0.89	2	1.02
10	**Sugarcane**	**114**	**95.0**	**230**	**56.37**	**103**	**91.96**	**161**	**82.56**
	Total	120	109.15	408	91.4	112	102.4	195	99.94

Table 10: Productivity of different crops and cropping intensity

Crops	Yield (q/ha)							
	Ahmadi	Hariyawan	Nagla Bhagwan	Loni	Ajbapur	Mohd. Bhagat	Munder	Kanhari
Paddy	50	50	-	36	45	45	37.5	43
Wheat	37	38	34	32	45	45	31.25	31.25
Urad	0	14	-	-	4.5	4.5	5	5.5
Lentil	0	10	-	7	-	-	8	7.5
Til	0	15	2	3	2.25	2.25	6.25	6.5
Mustard	12	12	-	-	15	13	12.5	13
Potato	60	200	250	300	-	-	250	260
Gram	0	14	-		-	-	15.6	16
Cucumber	0	0	72	72	-	-	-	-
Mango/ Orchard	0	20	200	200	-	-	-	-
Sugarcane	**580**	**550**	**500**	**430**	**625**	**580**	**550**	**567**
Cropping Intensity	170.83	182.35	209.82	186.15	130.14	111.36	194.35	216.04

In all surveyed villages, Co0238 is a major sugarcane variety and more than 90 per cent of cane area was under this variety in five villages (Table 11). Other cane varieties like Co0118, CoLk 94184, Co 98014, Co08272, CoSe95422, Co 05011, CoS 767, CoJ 88, CoS 8436, CoSe 98231, CoS 96264 are also in cultivation in these villages. As far as cane planting method is concerned, it was flat method being practiced by majority of the farmers in all villages (Table 11); however, trench method of planting is being adopted by some of the farmers. Application of chemical fertilizers like urea, DAP, MoP, NPK mixture, zinc, sulphur is largely practiced by the farmers. However, few number of farmers also apply sugar press mud (SPM), FYM and bio-fertilizer in cane crop. The application of bio-agents like *Beauveria bassiana*, *Trichoderma, Azotobacto*r and PSB is also in vogue there. Earthing up and cane propping operation was followed by small percentage of farmers in some of the villages. No other inter-culture operations in sugarcane crop were reported from these surveyed villages.

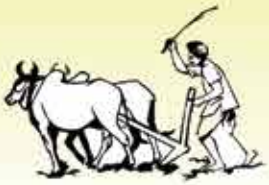


Table 11: Inputs and practices adopted

Village	Sugarcane Variety	Planting Methods	Fertilizer & chemicals	Bio agents	Plant Protection	Mechani-zation	Remark
Ahmadi	Co 0238, CoS 08272, Co 0118, CoLk 94184, CoSe 95422	Flat- 95%, Trench- 5%	DAP, Potash, Urea, Sulphur, Zinc	*Beauveria bassiana*	Coragen, Imidacloprid	Trench opener, Ridger	
Hariyawan	Co 0238 (90% area) , Co Lk 94184, Co 0118, Co 05011	Trench- 5% Flat- 95%	DAP, Urea, NPK, SPM, FYM, Bio fertilizer	*Trichoderma*	Coragen, Imidacloprid	Trench opener, Ridger	
Nagla Bhagwan	Co0238 (99% area)	Trench-20% Flat- 80%	DAP, Urea, NPK, SPM, FYM, Bio fertilizer	*Trichoderma*	Coragen, Imidacloprid	Trench opener, Ridger, Seed drill for wheat	Cane propping by 33% farmers
Loni	Co 0238 (99% area), CoLk 94184	Trench- 4% Flat- 96%	DAP, Urea, NPK, SPM, FYM, Bio fertilizer	*Trichoderma*	Coragen, Imidacloprid	Trench opener, Ridger	
Ajbapur	Co 0238 (90%), Co0118, CoS 767, CoLk94184, CoJ88	Trench- 5% Flat-95%	DAP, Urea, Potash, FYM, Zinc	*Trichoderma, B.bassiana, Azotobacto*r, PSB	Coragen, Imidacloprid	Trench opener, Ridger, Harrow, Cultivator	Cane propping by 12% farmers
Moh Bhagat	Co 0238 (95% area), Co098014, Co0118, CoS 767	Trench- 6% Flat-94%	DAP, Urea, Potash, FYM, Zinc	*Trichoderma, B.bassiana, Azotobactor*, PSB	Coragen, Imidacloprid	Trench opener, Ridger, Harrow, Cultivator,	Cane propping by 15% farmers
Munder	Co 0238, CoLk 94184, CoS 767, CoS8436, CoSe98231, CoS97264, CoJ88	Trench- 8% Flat-92%	DAP, NPK, FYM, Bio-fertilizer, SPM & Sulphozinc	*Trichoderma, B.Bassiana, Azotobactor*, PSB	Coragen, Chlorpyriphos and Imidacloprid	Trench opener, Ridger, Seed drill	Cane Propping and Earthing up
Kanhari	Co 0238, CoH 0119, CoLk 94184, CoS 767 and CoS 97264	Trench- 7% Flat-93%	DAP, NPK, FYM, Bio-fertilizer, SPM & Sulphozinc	*Trichoderma, B.bassiana,* Azotobactor, PSB	Coragen, Chlorpyriphos and Imidacloprid	Trench opener, Ridger, Seed drill	Cane Propping and Earthing up

Chapter 8

Livestock Status

Four livestock species namely cow (1051), buffalo (2080), goat (3030) and pig (162) were found to be reared by farmers of the chosen villages. The total livestock population is 6323, and per village is 790 (Table 12). In addition to livestock, poultry was found in only 2 villages and in one village one unit of fish rearing was reported. Stray animal incidence is quite prevalent in the area as reflected by the erection of fencing in around 20-25% of the area. Menace of *neel gai* and monkey is also quite significant, compelling the farmers not to go for vegetable or fruit crops. The share of cow, buffalo, goat and pig in total livestock population is 15.67, 36.50, 44.06 and 3.77 per cents, respectively (Table 12).

Table 12: Details of livestock in selected village

Sl. No.	Village	Cow		Buffalo		Goats		Pig		Total
		Nos.	Per cent	Nos.	Per cent	Nos.	Per cent	Nos.	Per cent	
1	Ajbapur	64	7.85	216	26.5	490	60.12	45	5.52	815
2	Mohmadpur Bhagat	47	33.33	54	38.3	40	28.37	0	0	141
3	Munder	230	14.87	260	16.90	985	63.67	72	4.65	1547
4	Kanhari	300	27.27	700	63.64	100	9.09	0	0	1100
5	Ahmadi	100	28.57	200	57.14	50	14.29	0	0	350
6	Hariywan	100	13.33	250	33.33	365	48.67	35	4.67	750
7	Nagla Bhagwan	100	16.67	200	33.33	300	50.00	0	0	600
8	Loni	110	10.78	200	19.61	700	68.63	10	0.98	1020
	Total	**1051**	**15.67**	**2080**	**36.50**	**3030**	**44.06**	**162**	**3.77**	**6323**
	Average per village	**131**		**260**		**379**		**20**		**790**

The breeds of *milch* animals are mostly non-descript. However, a few villagers are having good breeds of Sahiwal. The average milk yield is quite less, around 3 litres per day per cow and 4-5 litres per day per buffalo (Table 13). The milk yield per cow per day ranges between 1.5 to 4.0 litres, while it was 4.0 to 6.5 litres in case of buffalo. The total milk produced per day in all eight villages is 10466 litres comprising 2412 litres of cow milk and 8054 litres of buffalo milk. Goat is reared in the surveyed villages mainly for meat purpose.

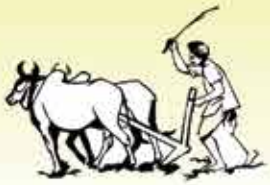


Table 13: Livestock rearing and milk production

Village	Cow				Buffalo			
	Total (nos.)	In milk (nos.)	Milk yield (lt./day)	Total milk production (lts./day)	Total (nos.)	In milk (nos.)	Milk yield (lt./day)	Total milk production (lts./day)
Ajbapur	64	48	2.0	96.0	216	180	5.5	990
Mohmadpur Bhagat	47	32	2.0	64.0	54	40	5.5	220
Munder	230	185	4.0	740.0	260	195	5.0	975
Kanhari	300	225	4.0	900.0	700	540	4.5	2430
Ahmadi	100	72	3.5	252	200	174	6.5	1131
Hariywan	100	78	1.5	117	250	192	4.0	768
Nagla Bhagwan	100	80	1.5	120	200	170	4.0	680
Loni	110	82	1.5	123	200	172	5.0	860
Total	**1051**	**802**	**3.01**	**2412**	**2080**	**1663**	**4.84**	**8054**
Total Milk Production per day in all 8 villages (2412+8054)= 10466 liters								

Chapter 9

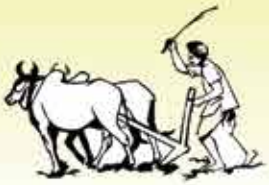
Employment Pattern and Source of Income

As evident from table 14, agriculture-cum-dairy animal rearing is the main income generating activity in all villages, followed by non-farm income through seasonal labour. The other source of income for villagers is small business, service, carpentry and fishery enterprise. Dairying and goatry are traditional enterprises and may play key role in enhancing income with the help of new govermental initiatives. Fishery enterprise is on very small scale and development of this enterprise on commercial scale could be encouraged for an enhanced outcome.

Table 14: Status of Employment Pattern and Sources of Income (%)

Village	Only Agri.	Agri.+ AH	Business /weaving	Service (Govt. & Pvt.)	Seasonal labour	Fisheries	Carpentry
Ajbapur	36.00	39.00	8.00	5.00	12.00	0	0
M. Bhagat	48.00	26.00	7.00	6.00	13.00	0	0
Ahmadi	31.67	22.62	4.52	2.71	38.01	0.45	0.00
Hariyawan	5.90	37.53	6.17	18.23	29.49	2.68	0.00
Nagla Bhagwan	0.00	86.96	0.00	5.80	7.25	0.00	0.00
Loni	0.00	50.28	2.51	0.47	46.55	0.00	0.19
Munder	36.00	41.00	0	0	19.00	3.00	1.00
Kanhari	33.00	44.00	0	0	20.00	3.00	0

The information emerged clearly depicts that farmers in the project areas are largely practicing crop and animal husbandry to earn income. Strategy to enhance income within short span of time must focused on introduction of interventions in these two enterprises. However, to sustain higher income in long run, the potential of non-farm enterprises like poultry, dairying, fishery, bee-keeping, goatry etc. must be explored through policy and development suport.



Chapter 10

Unique Features of Farming and Constraints

Efforts were made to collect pertinent data to draw inferences on the unique features related to farming and agricultural practices vogue in the selected villages. The information on general development constraints which affect day-to-day living of village dwellers, hampering the community development and economic growth, and degrading the quality of life was collected. The farming or agricultural specific constraints were also assessed. At last under this exercise probable scope of introducing new phenomenon or enterprise especially in agriculture was also contemplated. The information emerged on all these aspects are presented in table 15.

Out of the eight villages surveyed, four villages namely; Ahmadi, Nagla Bhagwan, Loni and Ajbapur are cane intensive villages where 80 per cent or more area is under cane cultivation. For development of farming and enhancing income of farmers in these four villages, the cane-based interventions must be focused in development strategy for effective execution of plan and have desirable results at the end. However, in two villages (Hariyawan and Mohd. Bhagat) cane area was in the tune of 55-60 per cent of total cultivable land, here also cane based intervention will be a good choice to enhance farm productivity and farmers' income. In the rest of two villages (Kanhari and Munder), the cane area was less, so strategy requires here is to increase cane area and to introduce prevalent cropping system based interventions.

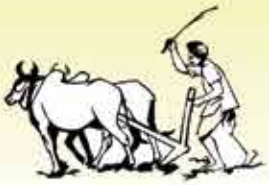
As far as the general constraints are concerned; poor road condition, availability of potable water and open defecation are the challenges. Seasonal unemployment, mainly during the months of April, May, June is prevalent in 3-4 villages. Poor drainage systems prevalent in villages not only hamper crop growth but also create un-hygiene condition in homestead area. Poor banking infrastructure, poor health facility, sanitation and lack of Government College in village area are the other constraining factors. The issues concerned with basic amenities were public toilet in village Panchayats, no safe drinking water, poor education facilities, menace of wild animals such as monkey, blue bull and stray cattle, poor health facilities and unemployment.

The major constraints in farming reported there are poor irrigation infrastructure, poor mechanisation in agriculture, lack of modern farm implements like power tiller, trench planter, RBS planter etc, crop damage by wild and stray animals, non-availability of quality agri-inputs, cane lodging, labour shortage during peak farming season, abundance of non-descript milch animals etc. In addition short supply of electricity; high cost of irrigation, fertilizers and agro-chemical; and lack of access road to the fields were also reported there. These constraints are major hurdle in enhancing farm productivity and farmers' income. The adverse impact on farming of erratic rainfall, high temperature was also felt.

However, tremendous opportunity and scope in agriculture are apparent that need to be exploited for enhancing income of farmers. The scope includes increasing area under autumn cane coupled with introduction of remunerative intercrops with autumn cane and enhancing cane yield through various cane based interventions. Large number of dairy animals in most of the villages provides opportunity to establish milk collection centre, cooling chamber and dairy processing infrastructure in the village. The social environment was normal; however opportunities for employment and cleanliness were reported poor in the villages.

Table 15: Village unique features and constraints

Village	Unique Feature	General Constraints	Agriculture Specific Constraints	Scope
Ajbapur	About 80% cultivable area is under sugarcane. Area under autumn cane and intercropping is negligible	Poor roads and drainage system, lack of banking and hospital facilities, drinking water facilities is lacking, lack of toilets and sanitation, seasonal unemployment, open defecation	Canal irrigation is not available, mechanization of farming operations is poor, damage of crops by wild animals, non-availability of quality agri inputs	Autumn cane planting, intercropping, milk collection booth and cooling chamber
M. Bhagat	Large percentage of area under sugarcane, autumn cane area is very less, Intercropping is not being practiced	Poor roads and drainage system, lack of banking and hospital facilities, drinking water facility is not available, lack of toilets and sanitation, seasonal unemployment, open defecation	mechanization of farming operations is poor, damage of crops by wild animals, non-availability of quality agri inputs	Autumn cane planting, intercropping, milk collection booth and cooling chamber
Ahmadi	Cane intensive village, more than 50% farmers grows crops on leased-in land, good numbers of absentee landlord, no intercropping in spring planted cane	no inter college, poor roads and drainage system, lack of banking and hospital facilities, drinking water facilities is lacking, lack of toilets and sanitation, seasonal unemployment	Cane lodging, nuisance of binding weeds, lack of farm roads, non-avaialbility of quality inputs at proper time, lack of FYM, dearth of farm implements and machines	Autumn cane planting, intercropping, scope for dairy and fishery
Hariyawan	Resource rich farmers are there and having off farm employment opportunities, variety of crops are grown, intercropping with cane is in practice	Lack of farm roads	*Neel gai* and monkey menace, labour shortage	Scope for poultry and dairy



Nagla Bhagwan	More than 90% of cultivable land is under sugarcane cultivation, meagre area under intercropping	lack of roads and drainage	Scope of cucumber cultivation, acute social stratification	High scope for sugarcane yield enhancement, autumn cane planting
Loni	Diversified population , less responsible population, seasonal unemployment	Lack of roads, drainage and toilets	Large no. of non-descript animals, stray animals, lack of quality seeds, poor cane yield	Scope of poultry, goatry, scope for sugarcane yield enhancement, autumn cane planting
Munder	Diversified population, less responsible population, seasonal unemployment	Lack of roads, drainage and toilets, open defecation	Large no. of non-descript animals, stray animals, lack of quality seeds, less area under sugarcane	Scope of poultry, goatry, increase cane area
Kanhari	Resource rich farmers having off farm employment opportunities, intercropping with cane is in practice	Lack of farm access roads	*Neel gai* and monkey menace, labour shortage	Scope for poultry, dairy

Chapter 11

Identified Interventions and Strategy

Intervention may be defined as pre-planned action to be introduced in a existing marginalised situation in order to improve it or prevent it from further getting worse. In a systematic empirical study of a social system targeted to improve the system, identification of suitable interventions, may be technological or developmental, based on base line information is of utmost importance. This provide real content a strategy to be follow or to be implemented in a social system to bring desirable change.

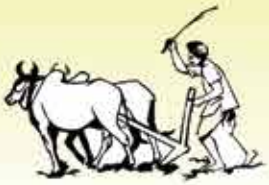
The information emerged out of bench mark survey conducted in the selected villages was well deliberated upon by group of social and biological scientists and all possible interventions was coined. Again all these interventions were cross checked and validated with available/existing resources and most viable and feasible interventions were considered for introduction in selected villages. Those were categorised as sugarcane based and general interventions.

Sugarcane-based interventions

1. Seed cane production: Healthy seed is pre-requisite for profitable agri-production system. In sugarcane, there is no effective mechanism tomake available sufficient quantity of healthy seed cane of new varieties. Seed cane production and multiplication in farmers' fields over large area may be game changer in cane production system. Every efforts should be applied to motivate farmers for practicing seed cane farming, so they may have access to better quality seed within their own locality.

2. Ratoon Management: Need for ratoon management stems from its being an integral component of sugarcane production system, contributing to over half the cane acreage; and as compared to corresponding plant crop, a ratoon crop has superficial roots, early shoot growth has to depend upon relatively less efficient root system. The main benefits of ratooning are that the crop matures earlier (by one and half month or so) in the season and also decrease the cost of field preparation, preparatory irrigation as well as seed cane used for planting. By early maturing may increase the effective crushing duration of sugar mill adding to sugar production. Multiple ratooning of sugarcane, with proper management including plant protection, may be utilized for maintaining purity of new improved varieties for a longer period of time. Ratoon management practices like introducing IISR developed ratoon promoter machine, spraying of PGR chemical at the time of ratoon initiation, gap filling, balanced fertilization, etc. must be promoted in the area to harvest the actual potential of ratoon crop.

3. Varietal balance: continuous supply of good quality cane for crushing in the sugar mill to sustain high sugar recovery throughout the crushing season is possible through proper



varietal balance in cane growing villages. Unfortunately, the distribution of cane rea is skewed towards one or two variety. This can be improved through introduction of more number of recommended cane varieties. Varietal cafeteria comprising 6-7 cane varieties may be established in each village to sensitise and motivate farmers for growing of many cane varieties rather to grow only one or two variety.

4. Intercropping with autumn cane: Autumn planted cane not only gives higher yield and sugar recovery, but it also provide ample opportunity to cultivate additional short duaration crop in between row spaces of cane crop in order to to harvest more system yield as well as to earn more profit per unit land area and time. Intercropping option with autumn cane includes pulses (pea, lentil, horse gram, etc.), vegetables (cauliflower, cabbage, potato, lady finger, radish etc.), spices (coriander, onion, garlic), oilseeds (mustard, toria, linseed etc.), cereals (wheat, maize, barley, etc.). The intercropping with cane also improves soil condition, provide intermittent income to the farmers, contribute in nutritional food security to the farmers by providing food items for family consumption within their limitd resources.

5. Autumn cane planting: In almost all villages area under autumn cane is very less. Scientifically it has been proven that autumn planted cane gives high cane yield and sugar recovery over spring planted cane. Large scale campaign need to be introduced to make aware farmers about the benefit of autumn cane and they has to be convinced through conduction of result demonstration on autumn cane planting.

6. Mechanisation of cane cultivation operation through introduction of trench opener, trench planter, different variats of cane cutter planter machines, Raised Bed Seeder (RBS) planter, Ratoon promoter etc.

7. Establishing infrastructure for rearing and multiplication of bio-agents to control insect-pests and diseases. Sugarcane is a perennial crop harbors number of natural enemies. These natural enemies play important role for maintaining pest population. Physical growth of the crop and availability of insect pests round the year give ample scope for the exploitation of biocontrol agents in the managements of sugarcane insect pests. In India *Trichogramma chilonis*, an egg parasitoid has been in use against sugarcane borers since long. This parasite is being mass multiplied and released in large number against cane borers. Later on other larval parasitoids like *Cotesia flavipes, Isotima javensis* etc., and nymphal and adult parasitoid, *Epiricania melanoleuca* has been used against different target pests. *Metarhizium anisopliae* and *Beauveria bassiana* have been used in management of sugarcane insect pests. Biological control agents are environmentally safe, non-toxic and non-polluting. and are pest-specific and greatly prefer to feed on the target organism, leaving non-pest organisms undisturbed. Once a biological control program is underway, the field aspects of the program are inexpensive compared to other control methods and require little human efforts. Biological control agents can sustain themselves and spread on their own. Beneficial animals and plants as well as people in an area where biological control is being used are largely unaffected by this method

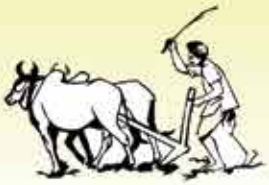
of control. Promoting use of bio-agents will also help in reducing chemical load in soil thus improving the soil and water quality.

8. Balanced Fertilization: Fertilizers are normally applied to increase crop yields, and when done properly, can balance out the utilization of all nutrients. This imbalance of nutrients can result in high levels of residual nitrate-N after harvest, and increase potential N loss through denitrification and leaching. When a nutrient is lacking, it can reduce utilization of other nutrients (even when they might otherwise be at sufficient levels), resulting in poor crop yield, and nutrient- and water-use efficiency. The four rules of fertilisation i.e. "4Rs"- right source, right time, right place and right dose; are a concept based on an integrated approach, must be introduced in agri-production system in the project area to the solve specific problem of soil health as well as to increase the efficiency of crop production in general.
9. Training of farmers in latest cane production techniques is one of the important intervention need to be executed in the project area.
10. Entrepreneurship Development: Entrepreneurship is the dynamic process of creating incremental wealth and innovating things of value that have a bearing on the welfare of an entrepreneur farmer. It provides an enormous amount of goods and services and enhances the growth of social welfare. The man behind the entrepreneurship is an action-oriented and highly motivated individual who is ready to achieve goals. Entrepreneurship development program focused on developing knowledge, skills, and understanding of how an innovative and creative idea, product, or process can be used to form a new and successful enterprise/business or to help an existing farm to grow and expand must be introduced there. Entrepreneurship Development Training of rural youth for *start up agri business* especially in seed cane production, bio-agents multiplication, production of tissue culture raised cane plantlets and bio-fertilizer production may be implemented in selected villages.

Other interventions

The contribution of non-farmer activities in total income of a farmers in around 40 per cent. So any strategy for doubling farmers' income should be inclusive of non-farmer and off farmer activities as well. Keeping this into consideration, the intervention related to non-sugarcane and non-crop was also contemplated, discussed and finalised, which are mentioned below.

- Facilitate liaisioning with state department of Agriculture, cane development, animal husbandry, fisheries, private agri-company etc.
- Liaisoning with KVK, ATMA, NEDA etc for providing training to farmers in crop enterprise, dairying, bee keeping, fishery, poultry etc.



- Encourage entrepreneurship development activities among youth for creating self employment and capital generation.
- Need to impart training to farmers on scientific livestock production and management for improving milk yield.
- PCDF / Amul dairy may be contacted to establish their milk procurement booth and cooling chambers in villages.
- Vocational training for rural youth in dairy, goat rearing, poultry and beekeeping need to be encouraged for enhancing income and employment generation activities.
- Women empowerment through formation of Self help group.
- Campaign to create awareness among villagers about harmful effect of open defecation system and overall village cleanliness under *Swachchh Bharat Abhiyan.*
- Awareness for prohibiting burring of farm waste such as sugarcane trash, straw of paddy/ wheat and other crop residue after harvest.
- Promoting vermin composting from farm and kitchen waste.
- Application of balance fertilizers in crop based on soil test report should be promoted.
- Introduction of at least 1-2 improved breeds of cattle, buffaloes and goats in the villages.
- Training to rural youths as paravets, and to establish fish rearing units.
- Gender specific training to girls in household management and fruit preservation.
- Introduction of backyard poultry.
- Introduction of fodder crops such as *berseem* in ratoon crop.
- Improving nutrition management in animals for enhanced milk productivity.

Present and targeted level of Income

Effort was made to assess the present level of cane yield and net profit earned by farmers from sugarcane cultivation in all eight selected villages considering base year 2016-17. As evident from table 16, the net income earned by farmers from cane cultivation was maximum in Ajbapur i.e. Rs.70000 per hectare, whereas the minimum was reported from Loni village that recorded Rs.52500 per hectare. Targeted level of cane yield and income is also presented in table 16, which clearly depict that by the end of year 2020-21, the net income of farmers from sugarcane cultivation will be more than double. To achieve this target several interventions (as discussed in chapter 11) are being implemented holisticaly.

Table 16: Present and targeted level of sugarcane yield and income

Village	District	Cane yield (q/ha)		Net income (Rs./ha)	
		2016-17	2020-21	2016-17	2020-21
Ajbapur	Lakhimpur	625	750-800	70000	145000
M. Bhagat	Lakhimpur	580	700-750	64000	130000
Ahmadi	Hardoi	580	700-800	65200	135000
Hariyawan	Hardoi	550	650-750	63000	122000
Nagla Bhagwan	Hardoi	500	700-750	58700	128000
Loni	Hardoi	430	600-700	52500	116000
Munder	Hardoi	550	700-750	62250	125000
Kanhari	Hardoi	567	700-750	63000	130000

Table 17: Present and targeted level of average annual income of farmers (Rs. per year)

Village	Farmers Category	Annual Income (Rs/year) 2016-17	Targeted Income by 2020-21	Tentative Increase in Income (%)
Ajbapur	Marginal	58450	120000	105.30
	Small	85800	180000	109.79
	Large	189700	363000	91.35
M. Bhagat	Marginal	52350	110000	110.12
	Small	72800	152000	108.79
	Large	177650	346000	94.76
Ahmadi	Marginal	56100	115000	104.99
	Small	82450	178000	115.89
	Large	180300	345000	91.35
Hariyawan	Marginal	52850	111000	110.03
	Small	72570	153000	110.83
	Large	165600	325000	96.26
Nagla Bhagwan	Marginal	47600	101000	112.18
	Small	68350	145000	112.14
	Large	158800	319000	100.88
Loni	Marginal	57750	108000	87.01
	Small	70600	156000	120.96
	Large	162400	325000	100.12
Munder	Marginal	51600	109000	111.24
	Small	77900	149000	91.27
	Large	174500	351000	101.15
Kanhari	Marginal	50750	104000	104.93
	Small	80300	170000	111.71
	Large	176400	338000	91.61
Average	Marginal	53431.25	109750	105.40
	Small	76346.25	160375	110.06
	Large	173168.75	339000	95.76

Strategy

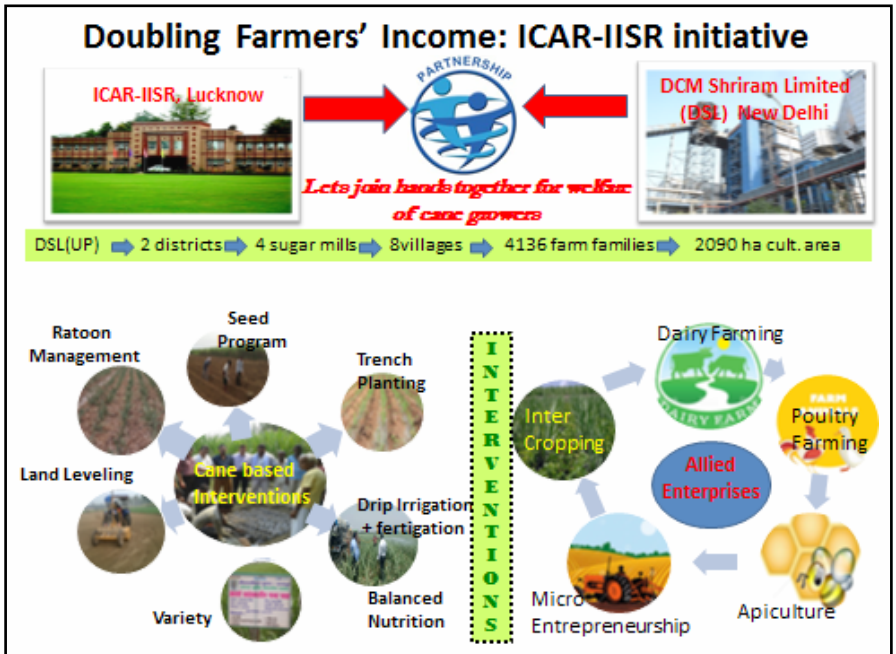


Figure 7: Pictorial view of strategic plan to double farmers' income

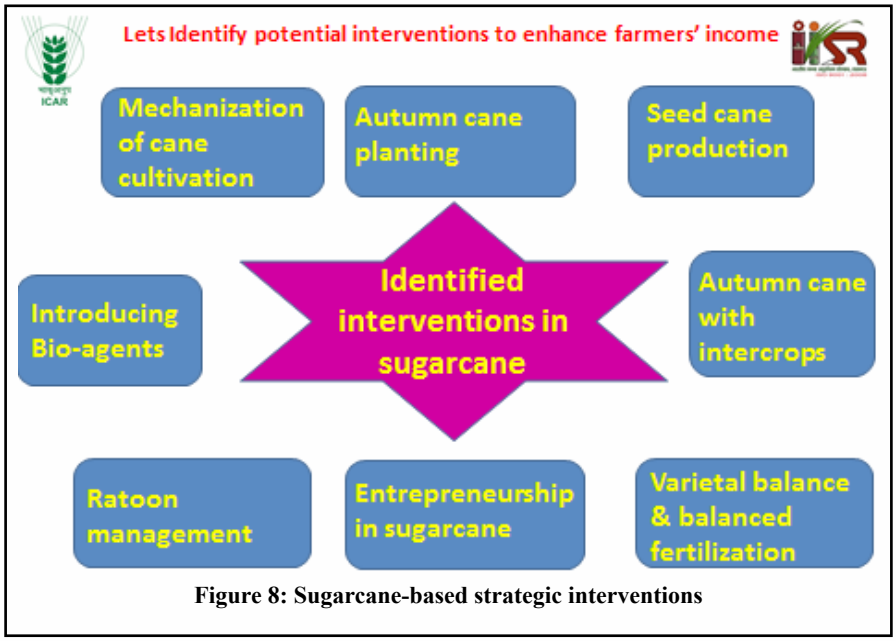


Figure 8: Sugarcane-based strategic interventions

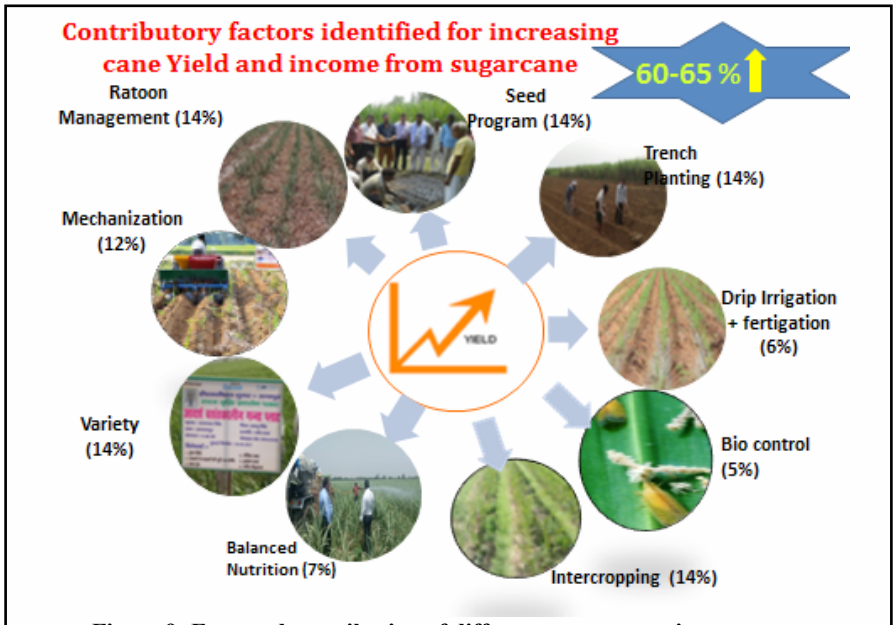


Figure 9: Expected contribution of different components in sugarcane

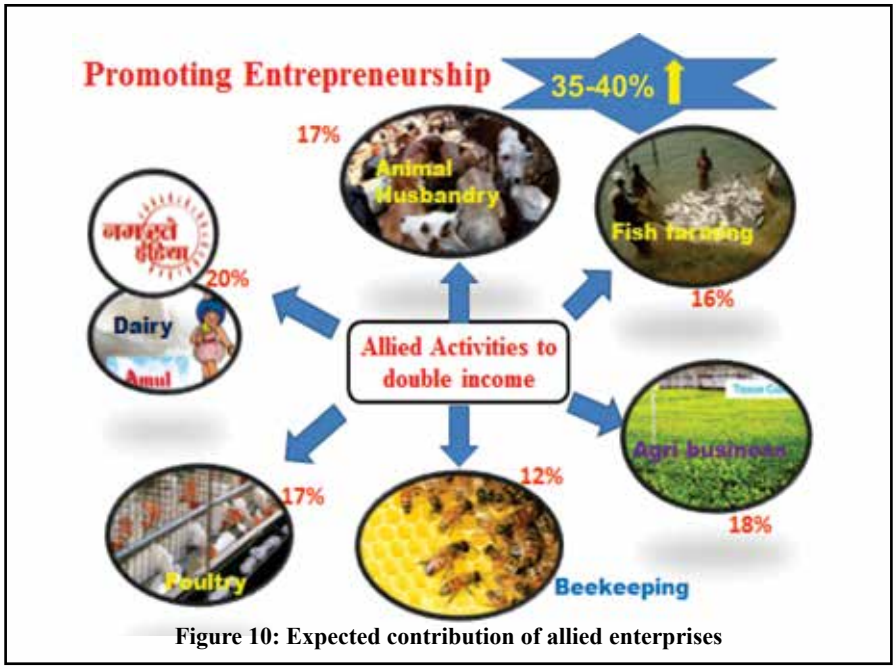


Figure 10: Expected contribution of allied enterprises

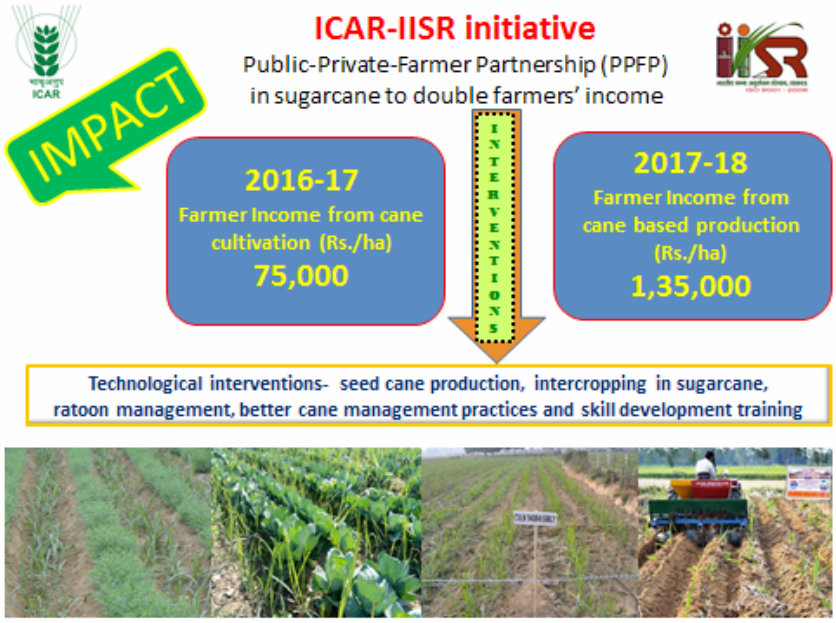


Figure 11: Short-term impact assessed in sugarcane

Signing of MoU between ICAR-IISR and DCM Shriram Limited (DSL), New Delhi On August 19, 2017

sunday pioneer
LUCKNOW | SUNDAY | AUGUST 20, 2017

ICAR-IISR signs MoU with sugar mill

PIONEER NEWS SERVICE | LUCKNOW

ICAR-Indian Institute of Sugarcane Research and DSCL Sugar has signed a MoU under public-private partnership for cane development activities in a time-bound manner in selected villages in sugar mill command areas. Under the agreement, the probable ways of increasing the income of farmers' income through increasing the productivity, reducing the cost of cultivation, promoting other allied activities and efficient marketing will be explored.

The project is a collaborative effort in the direction of Sankalp Se Siddhi Tak', the emphasis of Central government to double the income of farmers as well as new India making initiatives.

Rishi Tamak, executive director of DSCL Sugar, said that with the help of IISR as knowledge partner, ground level efforts towards four-pronged strategy of improving productivity, reducing costs of cultivation, earning additional income from the ancillary activities and sustaining the sugarcane cultivation would be executed in eight villages.

The two selected villages of all four sugar units of DSCL Sugar will be extensively surveyed by one extension scientist for collecting basic information and drawing baseline for the study. One scientist of agricultural extension will be associated for each of Ajhapur, Rupapur, Hariawan and Loni units of sugar mills. The selected extension scientists will visit the villages along with those from other divisions, disciplines to survey the farmers of different categories of the villages following standard procedures.

The IISR team will execute all the components of improved sugarcane production technology in these villages to practically ensure that the yields of the crops have improved, cost of cultivation reduced and the income of farmers enhanced.

अमर उजाला | राजधानी | लखनऊ रविवार, 20 अगस्त 2017 | 5

उत्पादन बढ़ाकर दोगुनी करेंगे किसानों की आमदनी

आईआईएसआर ने निजी चीनी मिल समूह से किया एमओयू

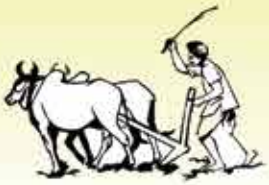
अमर उजाला ब्यूरो
लखनऊ।

भारतीय गन्ना अनुसंधान संस्थान (आईआईएसआर) ने वर्ष 2022 तक चुनिंदा गांवों में किसानों की आमदनी दोगुना करने के लिए एक निजी चीनी मिल समूह के साथ एमओयू साइन किया है। इस समूह के चार चीनी मिल क्षेत्रों के दो-दो गांवों में गन्ना उत्पादकता बढ़ाने और उत्पादन लागत कम करने समेत सभी संभावित कोशिशें की जाएंगी।

आईआईएसआर ने किसानों की आमदनी दोगुना करने के लिए एक निजी चीनी मिल समूह के साथ एमओयू साइन किया। अमर उजाला

संस्थान के निदेशक डॉ. अश्वनी दत्त पाठक ने बताया कि उनके संस्थान और डीएससीएल शुगर ने पीपीपी मॉडल पर गन्ना विकास के क्रियाकलापों के लिए सहमति पत्र पर हस्ताक्षर किए हैं। उनके निर्देशन में आईआईएसआर के परियोजना समन्वयक (गन्ना), सभी विभागाध्यक्ष, कृषि अर्थशास्त्र सांख्यिकी व प्रसार के वैज्ञानिक चार चीनी मिल क्षेत्र के दो-दो गांवों का गहन सर्वेक्षण करके गांव के बारे में प्राथमिक सूचनाएं एकत्र करेंगे। इन गांवों में गन्ना संस्थान की टीम गन्ना उत्पादन की सभी उन्नत प्रौद्योगिकी अपनाकर उपज बढ़ाने, उत्पादन लागत घटाने व कृषकों की आय बढ़ाने का हर संभव प्रयास करेगी।

चीनी मिल समूह के अधिशासी निदेशक रोशन लाल टामक ने बताया कि आठ चयनित गांवों में 2 लखीमपुर व 6 हरदोई जिले के हैं। इन गांवों में राज्य व केंद्र सरकार की योजनाओं पर भी काम किया जाएगा।



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Cattle Vaccination camp in Nagla Bhagwan village in Hardoi District

Let's Reach farmers' Doorstep for making them aware: campaign with Mobile Van

Awareness Camp: Let's motivate to move ahead

Auspicious beginning of cane planting

Sugarcane intervention: Planting of cane crop with IISR Trench Planter for enhanced germination, synchronous tillering, cost saving and more profit

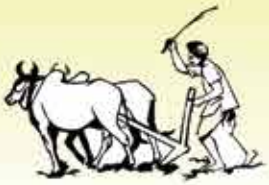
Pit digging for compost making

Let's improve soil health: vermicomposting

Matured cane of more than 16 feet height

Inauguration of seed cane planting

Let's Do Social Service: *Swachhta* campaign in selected villages



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