

# Agro-Economic Policy Briefs

*Aiding the Future of India's Farmers and Agriculture*



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For kind attention of:

The Hon'ble Prime Minister's Office,  
the Ministry of Agriculture and Farmers' Welfare,  
and all others interested

## On Critical Policy Issues in India's Agricultural Economy

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### Contents

1. Rescuing Sugarcane Crop through Drip Irrigation in Maharashtra 2
2. Role of Non-Farm Sector in Doubling Farmers' Income 3
3. Causes of Low Productivity of Pome and Stone Fruits in Himachal Pradesh 7
4. Status of Dairying and Potential to improve the Socio-Economic Status of Milk Producers in Assam 10

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# Rescuing Sugarcane Crop through Drip Irrigation in Maharashtra

Sangeeta Shroff

## Introduction

- Agriculture is the dominant economic activity in Maharashtra which employs about 52.4 percent workforce but makes a mere contribution of 9 percent to the state domestic product. This clearly speaks of low productivity in this sector which in turn leads to low incomes for the farming households. The state is water stressed with barely 18 percent of gross cropped area under irrigation. Sugarcane cultivation which occupies about 5 percent of the gross cropped area consumes most of the irrigation water as it is a highly water intensive crop.
- In order to cope up with the scarcity of water, technologies such as drip irrigation have been gaining importance since the 1990s. Maharashtra is the leading state with respect to the use of drip irrigation method which is mainly used for horticultural and commercial crops. Unlike surface method of irrigation, in case of drip, the root of the crop directly gets the water which finally leads to considerable saving of water. Since sugarcane is a water-intensive crop, farmers in some sugarcane cultivating regions began to adopt this method of irrigation. In view of the water saving capacity of drip technology and concern about over exploitation of ground water resources, the government of Maharashtra has made it mandatory for sugarcane cultivation to be under drip in at least about 30 percent of area under the crop in the first phase.
- Gradually, an attempt will be made to bring the entire

sugarcane cultivated under drip irrigation. In order to incentivize the farmers to invest in this technology, the government is giving subsidy to farmers by up to 50 percent or more of the equipment cost and loans at concessional rates of interest. Besides state policies, the central government also has policies such as “Per Drop More Crop” to promote micro irrigation.

## Findings

- In view of the above, a field visit was made to sugarcane growing regions, in order to discuss with farmers, the benefits accruing to them from the usage of drip technology as well as any constraints faced by them.
- The insights from the field survey in Pune District which is a major sugarcane belt revealed that farmers definitely made substantial benefits by switching over to micro irrigation. There was a unanimous response from all 60 farmers who responded that drip irrigation definitely saves water by as much as at least 30 percent as compared to surface irrigation. More importantly, since water is conserved, the farmers are able to provide irrigation to the crop even in summer months without which the crop could not have survived. Prior to the availability of water, the farmers were finding it difficult to prevent the crop from drying in the summer heat. However, due to availability of water the crop totally survives which is a big boon to farmers.

Figure 1: Drip Irrigation in Sugarcane.



Source: [www.bit.ly/2UZIPnI](http://www.bit.ly/2UZIPnI)



- Further, the farmers also experienced higher yields by about 35 percent approximately. The use of drip also led to the saving of inputs such as fertilizers as it could be applied to the root of the crop and therefore less was required.
- There was also less growth of weeds which reduced labour costs. Overall there was a reduction in cost and net benefit to farmers by about 33 percent in use of drip as compared to surface irrigation.
- The farmers also noted that many good brands of the drip irrigation system were available, and they received help from dealers with respect to availing of loans as well as maintenance. Also, the subsidy entitled to them was received in time and credited into their bank accounts.
- However, while the benefits of drip irrigation are large, there are several constraints as well. Those farmers who were reluctant to use drip irrigation, revealed that despite the subsidy they could not afford the capital expenditure.
- More importantly, in certain cases where the water had sand, it was necessary to fit sand filters which are fairly expensive and if not fitted, there would be clogging and also obstruction to the smooth flow of water. No subsidy was given for sand filters and hence overall installation of drip equipment became unviable.
- Another major constraint was damage caused to the lateral distribution line due to rodents which led to an uneven distribution of water.

## Conclusions and Recommendations

- It is necessary for the government to address the issues affecting the adoption of drip irrigation in order to spread its benefits. Subsidy should be provided for sand filters.
- Farmers who were non-adopters and had access to easy availability of water said that they did not feel the necessity of drip while non-adopters who had limited water resources revealed that they had intentions of switching over to drip method of irrigation. From the survey, it could be said that the government has made considerable efforts to spread awareness on micro irrigation and the farmers who have resorted to this method clearly stated that they would never revert to surface irrigation.

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## Role of Non-Farm Sector in Doubling Farmers' Income

Brajesh Jha

### Introduction

- Traditionally, agriculture has been the supplier of food and raw materials to the industries in India. Therefore, public policy has always been directed to increase agricultural production and the productivity of agriculture. The issue of farm income was hardly ever a priority in the earlier decades of development, especially post-independence. However, there were some noticeable happenings during that period such as, significant decline of size holdings, increase in the cost of production of agricultural commodities, and increased influence of world price volatility on the domestic market. All these have made farming difficult and now an increasing number of small farmers depend on off-farm income opportunities for their livelihood. In dearth of such opportunities in the rural vicinity, many land holders are migrating to distant places for livelihood, badly affecting agriculture of the region in the absence of suitable tenancy laws. Therefore, creation of non-farm opportunities in the rural vicinity is important for sustainable development of the region.
- The non-farm sector is considered important for transition of the economy in many countries; however, its role in farmers' income has not duly been recognized. Therefore, the present study discusses the role of Non-Farm Business (NFB) in farm income with the National Sample Survey Office's (NSSO) Farmers Situation Survey of 2002-03 and 2012-13. Subsequently, the study discusses the performance of important industries in rural area with NSSO Periodic Labour Force Survey (PLFS) data for states.

### Findings

- The paper, in brief, found that farmers dominated the

rural households in most of the states of India barring a few such as, Kerala, Tamil Nadu, Andhra Pradesh and West Bengal, where farmers account for less than 50 percent of rural households. Among farmers, marginal and small size farmers who possessed less than 2 hectares of land, account for more than 86

percent of farm households. Cultivation of crops is often not sufficient for their livelihood and they have to depend on off-farm sources such as rearing of animals, non-farm businesses, casual work and transfer payments.

**Table 1: Categories of States based on Income of an Average Farmer.**

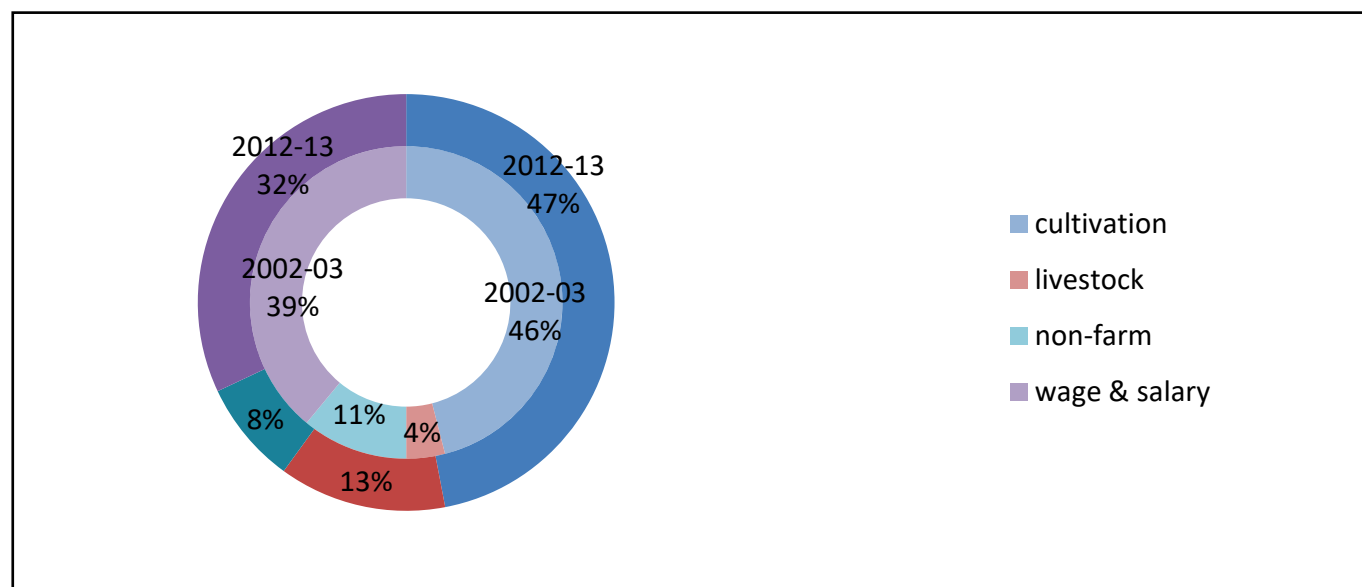
Categories of States	States with Monthly Farm Income (in Thousand in parentheses)
Low farm income (less than 5 thousand)	Bihar (3.6), Jharkhand (4.7), Odisha (4.9), UP (4.9), WB (3.9)
Middle farm income (between 5 to 8 thousand)	AP (6), Assam (6.7), Chhattisgarh (5.2), Gujarat (7.9), MP (6.2), Maharashtra (7.4), Rajasthan (7.3), Tamil Nadu (7), Telangana (6.3), India (6.4)
High income (more than 8 thousand)	Haryana (14.4), Karnataka (8.8), Kerala (11.9), Punjab (18)

**Source:** NSS Farmers Situation Survey 2002-03 and 2012-13.

- Further, in dearth of such opportunities, landholders (farmers) often migrate to distant places. Such migration not only affects poverty and civic amenities in urban places but also agriculture development of the village in the absence of suitable tenancy laws.
- A comparison of constituents of household income of an average farmer between 2002-03 and 2012-13 shows that the contribution of non-farm activities in the household income of an average farmer has

decreased during the period (Figure 1). The decrease in contribution of NFB in farm income will be even larger, if we can separate its role in wages and income of farmers. Therefore, unsatisfactory level of farm income in the latter reference period may also be because of low contribution of NFB in the farm income. Hence, NFB in addition to increased transition of economy (shift from farm to non-farm occupations) is also important for an increase in the farmers' income.

**Figure 1: Change in Source of Income of an Average Farmer (in percentage) between 2002-03 and 2012-13.**



**Source:** NSS Farmers Situation Survey 2002-03 and 2012-13.

- The share of NFB in household income of an average farmer has declined between 2002-03 and 2012-13 for most of the referred states such as Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Jharkhand, Madhya Pradesh, Odisha, Punjab, West Bengal (Figure 2). Exception in the above trend was noticed

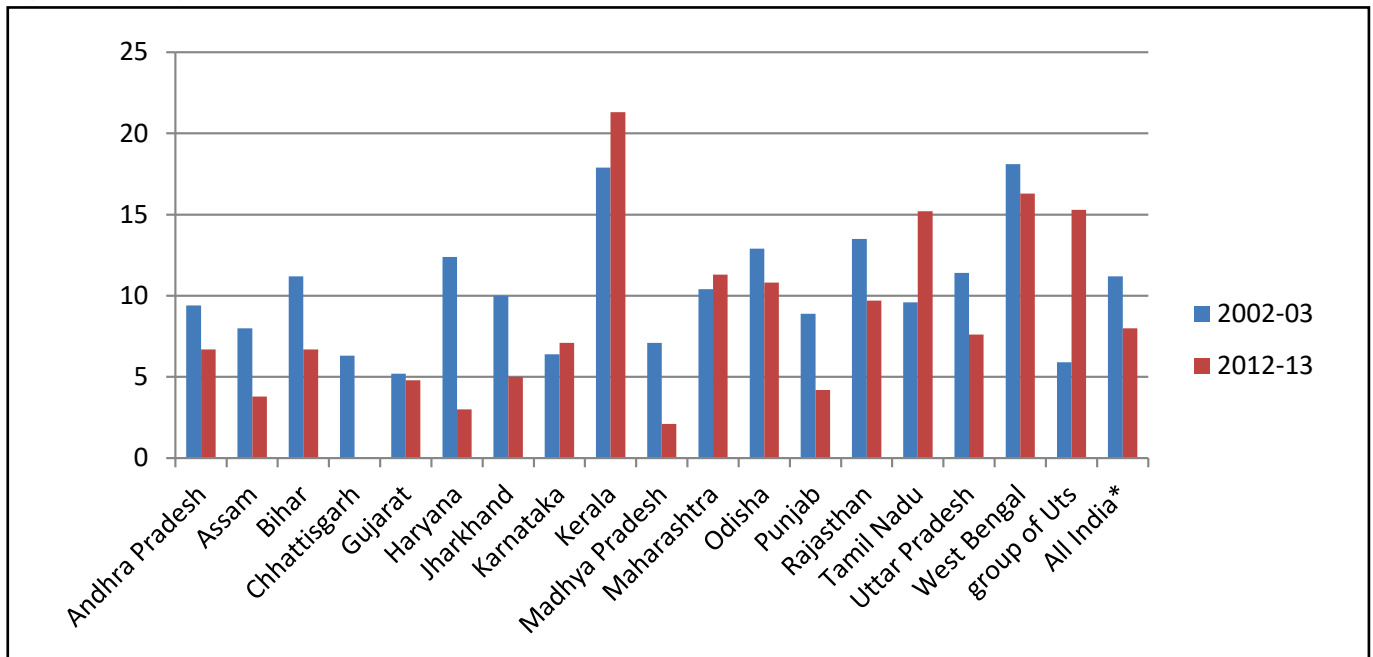
in Karnataka, Kerala, Maharashtra and Tamil Nadu.

- Figure 2 also presents the share of NFB in farm income of referred states in 2002-03 and 2012-13. The above share is high in 2012-13 in Kerala, Tamil Nadu and West Bengal; and low in the state

of Assam, Haryana and Punjab. If we collate these shares with farmers' income in states, they seem to be positively associated for most of the referred states, except Punjab, Haryana and West Bengal. In other words, the states with higher share of NFB in the household income of a farmer have high farm income. In Punjab and Haryana, farmers' income

was high despite low contribution of NFB in farmers' income. On the other hand in West Bengal, average farmers' income was low despite high contribution of NFB in farmers' income. The above paradoxical situation demands that rural diversification needs to be studied in detail.

**Figure 2: Change in NFB in States between 2002-03 and 2012-13.**



**Source:** NSS Periodic Labour Force Data (PLFS) 2002-02 & 2012-13.

- The same has been studied with distribution of rural workers in important industrial categories between 1999-00 and 2017-18. Table 2 presents comparative account of distribution of rural workers across states and reference years (1999-00 and 2017-18).
- With economic transition, the dependence of rural workforce on agriculture has decreased as evident in Table 2. After agriculture, manufacturing is the other important non-farm sector for a broad-based growth of income in rural India. The NSSO periodic data on employment however, shows that the percentage of rural work force in manufacturing has stagnated during the reference period (between 1999-2000 and 2017-2018). The load of increasing engagement of rural work force was shared by construction and other non-farm industries (trade, transport and services). The share of rural workforce

has increased during the reference period (Table 2). The employment of rural workforce in construction in most of the referred states has exceeded 10 percent. Various factors such as the extension of basic infrastructure (road and electricity) and specific economic policies influence growth of employment in construction.

- The effect of growth in real sector on non-farm sector depends on linkage of the sector with others; for example agriculture by the virtue of production and consumption linkage induces non-farm growth in the economy. Production of certain kind of manufacturing has advantage in the rural sector. Yet, gap in productivity of manufacturing, primarily on account of infrastructure, in rural and urban sector continues.

**Table 2: Distribution (in percentage) of Usual Working Persons by Important Industries in Rural Areas of Some States.**

	Manufacturing		Construction		Trade & Transport		Service & Others	
	1999-00	2017-18	1999-00	2017-18	1999-00	2017-18	1999-00	2017-18
Andhra Pradesh	5.6	5.98	2.2	9.31	6.3	10.65	7.1	7.14
Assam	4	6.06	1.8	10.2	10.8	17.98	15.7	15.58
Bihar	6.1	8.64	2.2	16.6	5.9	15.51	5.2	10.45
Gujarat	6.9	9.11	2.7	6.27	6.3	11.08	4.3	6.96
Haryana	7.3	11.5	6.5	15.1	9.3	17.69	8.4	14.96
Himachal Pradesh	4	4.5	9.2	14.75	5.7	9.39	7.5	11.5
Karnataka	5.4	7.6	1.5	5.62	6	11.85	5	7.76
Kerala	12.6	10.23	9.4	19.68	18.1	23.95	11.6	19.49
Madhya Pradesh	4	3.03	1.8	11.26	3.4	5.32	3.7	6.09
Maharashtra	4.9	5.4	2.3	4.51	5.6	8.24	4.6	7.35
Odisha	8.2	5.95	3.2	17.99	5.7	11.48	4.7	8.58
Punjab	5.9	11.61	5.3	16.97	9.6	14.99	6.6	15.75
Rajasthan	4.3	5.65	7.9	14.51	5.2	8.52	4.9	10.42
Tamil Nadu	13.9	14.31	4	17.88	8.2	14.89	6	10.41
Uttar Pradesh	7.8	8.3	3.3	14.72	7.5	11.37	5.2	5.87
West Bengal	16.6	13.59	2.2	12.1	11.8	14.77	5.8	8.88
All India	7.4	7.78	3.3	12.27	7.2	11.65	5.8	8.9

**Note:** Trade and Transport includes employment in trade hotels and restaurants and also in Transport and storage. Service & Others includes private (finance, real estate and business services) and public (community, social and personal services) services. Others include rural employment in mining and utilities.

**Source:** PLFS 2017-18, and NSSO 55th Round.

## Conclusions and Recommendations

- The study argues for identification of district with certain kind of manufacturing activities (organic or inorganic) and accordingly create infrastructure (basic and applied) and institutions. Government support is often insufficient therefore, the study argues for the involvement of business houses, expatriates in creation of suitable infrastructure and enhancement of credible initiative at micro-level.
- Though there are numerous public institutions for promotion of manufacturing and similar non-farm activities. The present study argues for a single window service provider as that of rural clinic. Promotion of rural business may require need-based innovations in institutions. Rural Non-farm Development Agency (RUDA) in Rajasthan is an example. Tourism is an important way of injecting money in economy of the region. With globalization and urbanisation new avenues for certain kinds of tourism, culture and orchard, would grow, provided suitable infrastructure is there.
- There are enough government programmes and policies to address various concerns of the rural economy. They, however, suffer from implementation related problems. Some efforts to improve implementation have already been undertaken in the recent past such as district plans (approved by district level panchayat committee) in a state, convergence of government programme at district level, digitalisation of information, and concurrent evaluation of government programmes. However, implementation is a continuous process and it needs to be reworked as per the problem that emerges during implementation of programme.

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# Causes of Low Productivity of Pome and Stone Fruits in Himachal Pradesh

Arvind Kalia, Anil Kumar, Sujan Singh

## Introduction

- The agro-climatic conditions in Himachal Pradesh are extremely suitable for growing different varieties of pome and stone fruits. The pome fruits (apple and pear) and stone fruits (apricot, peach and plum) are the most widely grown and eaten, owing to their adaptability. Even though the State has achieved a significant progress in the production of pome and stone fruits in the country, the productivity of these fruits is far below the desired level. The area, production and export of fruits and its contribution to the Gross Domestic Product (GDP) of agriculture has increased over the period of time. However, the variation in the productivity of fruits in the recent years has become a serious concern for the growers of Himachal Pradesh.
- The productivity of fruits has been fluctuating from year to year. The factors which influence yield are climate, variety, pollinizer, pollinator, soil, and cultural management practices. Most of the factors influencing productivity are manageable to a large

extent but the climatic factors are beyond the control. The main objective of the study is to highlight the causes of low productivity of pome and stone fruits in Himachal Pradesh.

## Findings

- In the study area, it was found that 68 percent households considered climatic factor as one of the causes of low productivity of pome fruits. Among the marginal to medium farms, this percentage ranges from 53 percent to 83 percent, whereas on stone fruits farms, 80 percent households reported climatic factors as one of the causes of low productivity of stone fruits. The households further reported that at the time of flowering and fruit setting, low temperature adversely affected the production of these fruits. Fluctuating rainfall during this period accompanied by low temperature hinder cross pollination due to restricted bees' activity, washing off of pollen and poor pollen tube growth.

Figure 1: Pome Fruits (left); Stone Fruits (right).



Source: [www.bit.ly/2vHYBYE](http://www.bit.ly/2vHYBYE); [www.bit.ly/2u0LeC6](http://www.bit.ly/2u0LeC6)

- Among the pome fruit growers, about 40 percent households reported there is a problem of improved variety of pome fruit and considered it as a cause and reason of low production and productivity of these fruits. Further, they reported that in Himachal Pradesh there is a predominance of traditional varieties and these varieties have a strong tendency of alternate bearing, which is also one of the reasons for low production and productivity. Among the stone fruit growers, near about 44 percent households reported this problem.
- In Himachal Pradesh there is a problem of inadequacy of pollinizers, and around 29 percent households considered this as one of the causes of low productivity of pome fruits. Among the stone fruit growers, nearly 34 percent households at overall level considered inadequate pollinisers as one of the reasons of low productivity.

- Around 25 percent households reported that there is a dominance of traditional pollinators resulting in low productivity of pome fruits. Among the stone fruit growers, about 32 percent households at overall level reported it as one of the causes of low productivity. Honey bees are the major agents besides other

wild pollinators for effective pollination of fruits. Households further reported that over the years, the population of honey bees and other pollinators has declined due to unsystematic use of pesticides. Placement of honeybees in the orchards has also not picked up due to the shortage of beehives.

**Table 1: Factors of Low Productivity of Pome and Stone Fruits.**

Sr. No.	Factors	Pome Fruits Growers				Stone Fruits Growers			
		Marginal	Small	Medium	All	Marginal	Small	Medium	All
1.	Climatic Factors	53.3	85.7	83.3	67.9	79.4	81.8	80.0	80.0
2.	Varietal Factors	26.7	42.9	66.7	39.3	41.2	45.5	60.0	44.0
3.	Lack of Pollinizers	13.3	42.9	50.0	25.0	38.2	27.3	20.0	34.0
4.	Lack of Pollinators	33.3	85.7	33.3	46.4	29.4	36.4	40.0	32.0
5.	Inadequate Nutrition	40.0	71.4	33.3	46.4	58.8	54.6	80.0	60.0
6.	Poor Soil Condition	73.3	57.1	50.0	50.0	35.3	45.5	40.0	38.0
7.	Poor Canopy Management	40.0	71.4	50.0	50.0	32.4	27.3	40.0	38.0
8.	Senile Orchards	40.0	71.4	50.0	50.0	61.7	54.6	60.0	60.0
9.	Pathology Factors	40.0	57.1	50.0	46.4	47.1	36.4	40.0	44.0
10.	Entomological Factors	66.7	85.7	33.3	64.3	50.0	45.5	60.0	50.0
11.	Inadequate Irrigation Facilities	93.3	71.4	50.0	78.6	52.9	63.6	80.0	58.0
12.	Problem of Extension Services	80.0	57.1	50.0	67.9	47.1	45.5	60.0	48.0
13.	Problem of Fertilizer Outlet	73.3	71.4	66.7	71.4	35.3	27.3	60.0	36.0
14.	Problem of Plant protection Materials	80.0	85.7	66.7	78.6	50.0	36.4	40.0	46.0

Source: AERC Shimla.

- Among the pome fruit growers 46.4 percent households reported that there is inadequacy of nutrients and the same results in low productivity of apples and pears. Whereas among the stone fruit growers 60.0 percent households at overall level reported this problem. Households also reported that due to hilly terrain, cultivation of fruits is mostly done on the slopes which creates serious problem of water and nutrient losses. It is also observed that sometimes there are dry spells during April-June and September-November, which make the nutrients unavailable to the plants even if applied adequately in the soil. Contrarily, leakage of the nutrients during rainy season from July-August further affects the health of the fruit trees. It has also been noticed that the fertilizers are not applied according to the requirement of the fruit trees which is yet another cause of low productivity.
- Among the pome fruit growers, at overall level 46.4 percent households reported that soil of their land was in a poor condition which resulted in the low productivity of these fruits. Whereas among the

stone fruit growers at overall level 38.0 percent households considered poor soil condition as a cause of low productivity of stone fruits. Further it was also observed that in many orchards, soils which do not have adequate drainage facilities and temporary water logging during the rainy season destroy the feeder roots and temporarily restrict the uptake of the nutrients.

- At overall level, 64.3 percent households considered poor canopy management as one of the causes and reasons for low productivity of pome fruits while among the stone fruit growers, at overall level this percentage came out to be 32.0 percent. Further, it was also observed that the orchardist's dependency on hired pruners is increasing day by day. The fruit plants were not properly trimmed and pruned by these untrained pruners resulting in low production and productivity of fruits.
- Among the pome fruit growers, around 50.0 percent households considered senile orchard as a cause of low productivity of stone fruit, while 60 percent



- households of stone fruits growers considered this a problem. It is also observed that the old orchards have also been planted under traditional system and such orchards do not produce adequate annual growth and usually have foliage of small size.
- Among the pome fruit growers 46.4 percent households at overall considered pathological factors as one of the causes of low productivity of these fruits. Among the pome orchards number of diseases has been observed which are affecting the pome orchards viz; scab, premature leaf fall, root rot, colour rot, replant problem, powdery mildew, cankers and viruses. The most serious among these is scab. Further among the stone fruits the most destructive diseases are leaf curl, brown rot, powdery, rust, leaf spot, scab, canker and dieback, black not, wilt and root rot.
  - The magnitude of pest in incidence varies from region to region and orchard to orchard. Aphid is most dominant affecting orchards to a large extent. Among the pome fruit growers overall 64.3 percent households considered entomological factors as one of the causes of low productivity of the fruit. Whereas among the stone fruit growers overall 50 percent households considered this factor to be one of the causes of low productivity.
  - Availability of irrigation facilities also influenced the productivity of fruits to a large scale. Among the pome fruit growers about 79 percent households at the overall level reported that there is a problem of irrigation, which is one of the causes of low productivity among the stone fruit growers at overall level 58 percent households reported inadequate irrigation facilities.
  - Inadequate extension service was another cause of low productivity. Among the pome fruit growers at overall level, near about 79 percent households reported this problem. Among the stone fruit growers only 48 percent households reported this problem.
  - In the study areas farmer reported that the fertilizer outlets were a bit far. Due to the distance, sometimes farmers did not purchase it on time. Among the pome fruit growers at overall level 71.4 percent households reported this problem. Among stone fruit growers, 36 percent households reported this problem.
  - In the study areas farmers reported problems related to plant protection materials such as its cost and availability. Overall 79 percent of pome fruit growers reported this problem while 46 percent of the stone fruits growers reported this problem and considered it as one of the causes of low productivity.

## Recommendations

- Government should ensure availability of rootstocks and good quality planting material by using micro-propagation techniques and plantations of suitable varieties at suitable sites.
- The availability of imported cultivars of pome and stone fruits should be ensured instead of the low yielding inferior plantations.
- Pome and stone fruits show a decline in productivity potential and fruit quality. Majority of orchards are senile and have become unproductive and uneconomical. Scientific research should be done in order to rejuvenate these orchards on a priority basis to enhance productivity.
- Orchard management should be done efficiently. Farmers should be educated on the importance of irrigation, nutrient management and expansion of area under cultivation.
- Such varieties must be developed which are resistant to major pests and diseases by non-convention approach in order to enhance the productivity of pome and stone fruits to a desired level.
- High density planting of fruits should be encouraged as it is important due to technology intervention and small holdings. This system provides high productivity, precocity, high returns per unit area and efficient use of inputs.
- Efficient canopy management must be ensured through proper training and pruning as it enhances the productivity of quality fruits due to proper light interception, photosynthesis and dry matter accumulation.

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# Status of Dairying and Potential to improve the Socio-Economic Status of Milk Producers in Assam

Gautam Kakaty, Anup Kr. Das, Moromi Gogoi

## Introduction

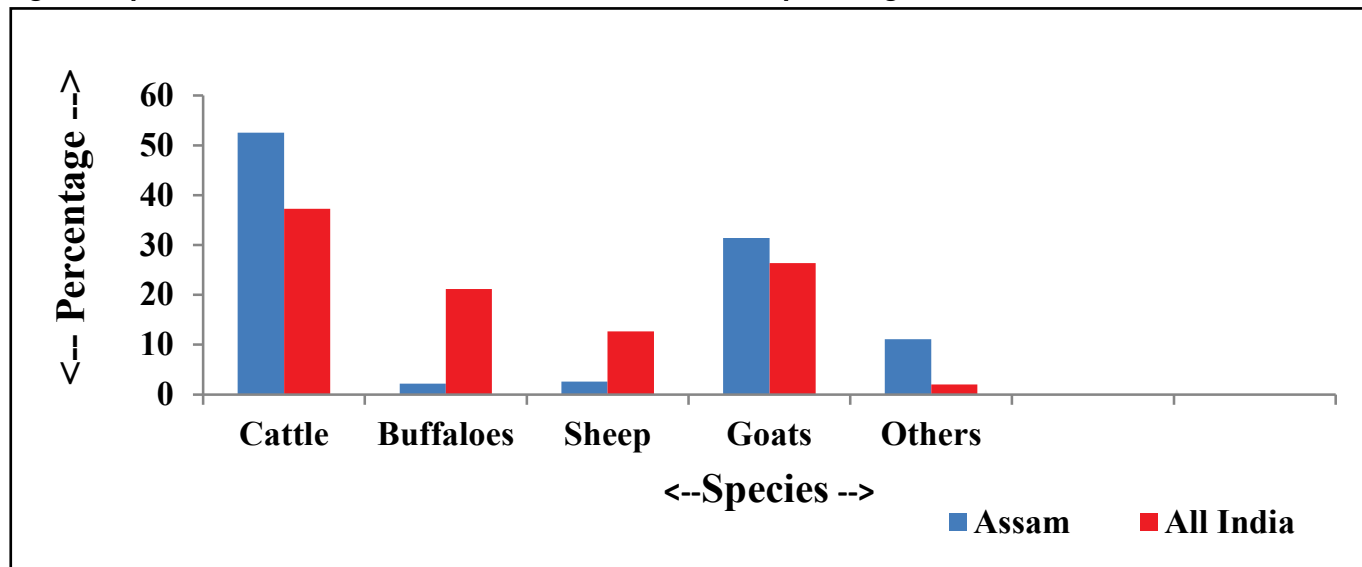
- Dairy farming is an important enterprise that provides employment, income and nutritive food to the people and also supplies cow dung as organic manure to enrich soil fertility and thus help in increasing crop production.
- The objectives of the present study are to assess the present status of dairying with reference to animal distribution, milk production, consumption and marketable surplus; to identify the constraints in dairy development from supply side, institutional deficiency and processing infrastructure; to highlight the facilitating factors that could help in promoting dairy development in order to improve the socio-economic status of the milk producers; to suggest broad areas for focussed interventions for promoting dairy development in the state and the way forward and to suggest suitable policy measures.
- The study is based on both primary and secondary data. The primary data were collected from four

districts of Assam viz., Nagaon, Barpeta, Kamrup and Jorhat and from each district, four villages were selected. Further, from each village, 15 milk producers were selected randomly based on the number of bovine population - (a) Small Milk Producers (1-2 milch animals), (b) Medium Milk Producers (3-5 milch animal) and (c) Large Milk Producers (above 5 milch animals). Thus, the sum total of sample villages for the study stood at 16. Altogether, the study covered 240 sample milk producers. In addition to this, 1 milk union and 8 Primary Dairy Cooperative Societies were also selected for the study.

## Findings

- According to the Livestock Census 2012, the cattle population constituted the largest group with more than 10 million cattle population which however, was 1.2 percent less, as compared to 2007 Livestock Census. This decline may perhaps be attributed to declining growth rate (-5.8 percent) of cross breed cattle.

Figure 1: Species-wise Share of Livestock in Assam and All India (in percentage).



Source: AERC Assam.

- In 2014-15, cattle milk contributed 82.6 percent of the total milk production of the States. The annual compound growth rate of milk production during the

period was highest (2.1 percent) in buffalo followed by cattle (0.9 percent) while it was negative in case of goat (-2.5 percent) as shown in Table 1.

**Table 1: Share of Milk Production by Cows, Buffaloes and Goats in Assam.**

Year	Cattle (Million Litres)	Buffalo (Million Liters)	Goat (Million Liters)	Total (Million Liters)	Per capita availability (ml/Day)
2000-01	612 (83.15)	98(13.32)	26(3.53)	736 (100)	70
2001-02	628 (83.73)	97(12.93)	25(3.33)	750(100)	71
2002-03	647 (83.70)	98(12.68)	28(3.62)	773(100)	71
2003-04	662 (83.27)	100(12.58)	33(4.15)	795(100)	72
2004-05	681 (83.87)	102(12.56)	29(3.57)	812(100)	72
2005-06	689 (83.82)	103(12.53)	30(3.65)	822(100)	70
2006-07	690 (83.84)	105(12.76)	28(3.40)	823(100)	70
2007-08	687 (83.37)	109(13.23)	27(3.28)	824(100)	69
2008-09	691 (83.56)	110(13.30)	26(3.14)	827(100)	70
2009-10	698 (84.10)	108(13.01)	24(2.89)	830(100)	69
2010-11	702(84.27)	106(12.73)	25(3.00)	833(100)	71
2011-12	692(82.51)	123.4(14.71)	23(2.74)	838.7(100)	70
2012-13	697.4(82.55)	128.7(15.23)	18.7(2.21)	844.8(100)	69
2013-14	712.66(83.13)	128.5(14.99)	16.1(1.88)	857.26(100)	72
2014-15	721.09(82.61)	126.2(14.46)	25.6(2.93)	872.89(100)	74
ACGR(%)	0.92	2.13	-2.47	0.98	0.05

**Note:** Figures in parentheses indicate percentage share of milk production to total.

**Source:** Directorate of Animal Husbandry and Veterinary, Guwahati.

- The review of the status of Dairy development in Assam indicates that despite having sizeable number of cattle, milk production in the State is not up to the satisfactory level. It has also been observed that the indigenous cattle continues to contribute larger share of the State's total milk production, with 54.3 percent while the contribution of crossbreed cow stood at 28.8 percent only.
- Contrary to the recommended norms of Indian Council of Medical Research (ICMR) which is 208 ml per head per day, per capita/per day milk consumption in Assam is only 74 ml. Assam could produce only 35.81 percent of the total milk requirement in the year 2015-16. As such, Assam is a deficit State in terms of milk production.
- At present, there are 341 primary dairy cooperative societies in the State. In 2015-16, the total members of the dairy cooperatives stood at 16,000 in Assam. As against this, only about 42,000 litres of liquid milk are marketed daily by the dairy cooperative societies. As per National Dairy Development Board (NDDB) Annual Report 2015-16, the percentage share of Assam in total milk procurement by cooperative sector in India was only 0.05.
- A good number of programmes and schemes have been implemented in Assam for the development of dairy sector. Apart from the Central and State Government programs, the milk union has also evolved a variety of schemes that provided incentives to the milk producers. However, the overall performance of most of the schemes has not been to the desired levels. Problems lay with funding pattern and poor flexibility and most of the schemes were standing alone with meagre financial outlay. All the ongoing schemes relating to dairy development in Assam should be converged and put under three mega schemes; a) Animal Production, b) Livestock Health and c) Dairy Development.
- The total milk collection at Primary Dairy Cooperative Societies (PDCS) was much higher than that of Private Dairy Units (PDU), while per litre milk rate was relatively lower in PDCS as compared to PDU.
- The average yield rate of per local cow/day for PDCS milk producers in the rainy season was found at 1.22 litres, in winter season it was 1.33 litres and in the summer season, it was found to be 1.24 litres.
- In case of crossbreed cow, PDCS milk producers fetched 5.3 litres/day in rainy season, 5.9 litres/day in winter season and 5.45 litres/day in summer season.
- The PDCS households were more aware about the various dairy development schemes/programmes and availed more benefits from those schemes.
- The PDCS sample households sold the entire milk



produced by the local cows to the consumers at an average price of Rs. 40.50/ litre on monthly payment basis. They disposed entire amount of marketable surplus of crossbreed cows to the dairy cooperative societies with weekly payment basis at an average price of Rs. 35.33/ litre.

- The PDCS households received adequate supply of cattle feed both from cooperative society and private agent with credit facilities. But most of the respondents opined that cost of cattle feed and mineral mixture was high.
- Major infrastructural constrains in case of PDCS households included lack of improved equipment, unavailability of emergency vaccine services, inadequate visit of veterinary staff, unavailability of cattle feed and fodder on credit.
- The PDCS households experienced the economic constraints like high cost of fodder seed, low price of milk, high cost of crossbreed cow, high cost of medicine, high cost of cattle feed and mixture, low incentive for supplying milk, high charges of emergency veterinary services.
- The major constraint as reported by the sample PDCS and PDU was the competition from imported dairy products. Competition from private dairy, unstable prices of milk, inability to market the value-added products and poor road infrastructure were the other marketing constraints faced by both the groups.
- The problems faced by the lone milk union in Assam were lack of skilled manpower, lack of availability of raw materials for manufacturing of cattle feed locally in a viable manner, lesser number of crossbred animals in the State and non-adherence to the principles of Anand pattern cooperatives/three tier structure by the village level PDCS.

## Recommendations

- There is a need to evolve a comprehensive dairy development policy in the State through genetic improvement of indigenous milch animals. Process should be initiated for production of good quality semen from high genetic sources. In order to

achieve that, the existing semen stations should be strengthened and upgraded.

- Revival of non-functional milk unions viz. EAMUL located at Jorhat and CAMUL at Silchar should be ensured.
- In order to overcome the fodder deficit, the Animal Husbandry and Veterinary Department of the state, should take up elaborate programmes for enhanced fodder production throughout the state.
- There is a need to assist and train the milk producers in the field of breeding, feeding, animal management technique and marketing of milk and milk products in a cost effective manner.
- Livestock insurance coverage should be extended to all types of production systems and species with suitable incentives.
- Well-equipped laboratories for testing adulterants, antibiotics, residues and food borne pathogens should be established to enhance safety and quality of animal feeds and foods.
- Development of dairy farming on sustainable basis through optimum utilization of natural resources, adequate health-care facilities for livestock, improvement of breeding programmes through artificial insemination, improvement of present milk marketing system and timely vaccination can go a long way in bringing marked changes in the lives of the milk producers.
- Establishment of organized network of market can benefit the livestock farmers in getting their due share for the products. Networking of village level dairy co-operatives can benefit all the stakeholders on several fronts. Strengthening of market linkages through expansion of cooperatives and facilitating new models of dairy farming would go a long way in further improving milk yield in the state.

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