

Prospects and Problems of Horticultural Crops for Agricultural Development in Assam

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Abstract

Horticulture, which includes a wide variety of crops such as vegetables, fruits, Spices, floriculture, plantation crops, cashew, medicinal and aromatic plants etc is an important sector for potential diversification and value addition in agriculture in India particularly in Assam. Growing horticulture crops improve livelihood security, enhance employment generation, attain income and food security and increase income through value addition. Horticultural crops, particularly fruits are now beginning to receive attention in view of its increasing commercial importance accentuated by quick transportation to vast internal market. Adoption of drip irrigation in Assam has led to increase in the productivity of mangoes, coconut etc.

In order to harness the huge potential of horticulture in Assam the government of India launching National Horticulture Mission (NHM) for horticulture crops to established central Institute of Horticulture for the North East region at Nagaland. Further, infrastructure facilities for improving production and Productivity of crops such as model nurseries, community tanks, tube wells, greenhouses, mode floriculture Centre's, mushroom units, vermi-compost units, training of farmers, training of women and market infrastructure and processing units have also been created. Through this paper I want to show the problems and prospects of Horticulture crops for agriculture development in Assam.

The term horticulture has precisely been derived from the Latin word. Hortus means garden and cultus means tilling. It is also generally defined as the subdivision of agriculture dealing in gardening. In other word, we usually understood as the culture of growing garden plants. This subsidiary occupation are broadly divided into seven types viz, a) Arboriculture b) Floriculture c) Landscape horticulture d) Olericulture e) Pomology f) Post-harvest physiology

g) Viticulture. To be more precise and brief, the D.K. Oxford Dictionary defines as 'the art or practice of cultivating and managing Garden (2011, Revised edition). So also the Concise Oxford English Dictionary defines as the 'art or practice of garden and management (2010, edition).

Horticulture involves five areas of study. These areas are floriculture (includes production, marketing of floral crops), landscape horticulture (includes production, marketing and maintenance of landscape plants), olericulture (includes production and marketing of vegetables), pomology (includes production and marketing of fruits), and post-harvest physiology which includes maintaining quality and preventing spoilage of horticultural crops.

Assam is the central state in the North-East region of India and serves as the gateways to the rest of the seven sister states. This state is endowed with diverse agro-climatic conditions, which permit growing of wide range of horticultural crops. It accommodates various fruits, vegetables, flowers, spices, medicinal and aromatic plants, nut crops, tuber crops and also plantation crops. The challenge of growing population is daunting while all the economic sectors depend to some degree on ecosystem services like agriculture and allied activity specially like that of horticulture. Horticulture help in maintaining healthy ecosystem, water regulation, pollination, erosion control and climate and wind regulation so also world food security issues could have been solved by paying greater importance to the role of horticulture. In a flood prone state like Assam where productivity of major crops like rice is not stable, increase in production of horticultural crops can minimize the impact of crop failure and provide monetary security to the farmers. Moreover, horticulture has the greatest potential for generating employment opportunities in Assam. This paper makes an attempt to explore the prospects and problems of horticultural crops for agricultural development in Assam.

Objective of the paper:

The objective of the paper is to analyze the prospects and problems of horticultural crops for agricultural development in Assam.

Methodology:

This research paper is the form of an explanatory study in analyzing the potentiality from Assam, which will maintain a bright prospect of economic development in terms of horticulture industry and the various problems faced by the industry. Here only secondary data analysis is utilized, which are collected from Department of Agriculture, National Horticulture Board, and various research papers published in internet etc.

Horticulture crops in Assam:

Assam is endowed with diverse agro-climatic conditions, which permit growing of wide range of horticultural crops like vegetables, flowers, spices, medicinal and aromatic plants, fruits, nut crops, tuber crops, plantation crops etc. Assam represents a mixed terrain of hills and plains intercepted by a large number of rivers and streams. Horticulture crops cover an area of 5.75 lakhs hectares' in the state in the year 2011-12. The important fruit crops in the state are banana, pineapple, citrus, jackfruit, guava and litchi. Coconut, areca nut and betel vine are predominant plantation crops. Potato, sweet potato, tapioca, colocasia and yams cucurbits, peas, beans and okra are cultivated in commercial scale. Ginger and turmeric occupy prime position among the spices.

Assam has a rich diversity in fruit crops. In citrus, there are as many as 17 species, 53 varieties and 7 hybrids. Wild and semi wild species of mango and temperate fruits particularly of the Rosaceae family occur in the state. In addition, quite a good number of traditional fruit crops like letoky (*Baccaurea sapida*), poniol (*Flacourtia gangomos*), nagatenga (*Rhus semialata*), thereju (*Prunus jenkinsii*), Kordoi (*Averrhoa carambola*), mirika tenga (*Parameria polyneura*), amora (*Spondias mangifera*), outenga (*Dillenia indica*), silikha (*Terminalia chebula*), bhomora (*Terminalia belerica*) etc. are found in the state. Table-1 represents the horticultural crops grown in the state.

Table: 1
Horticultural Crops of Assam

Fruits	Banana, Jackfruit, Pine apple, Papaya, Assam Lemon, Orange, Litchi, Guava, Mango, Sapota
Traditional Fruits	Carambola, Leteku, Paniyal, Thekera, Rabab Tenga, Au Tenga,
Vegetables	Ash Gourd, Bitter gourd, Bottle gourd, Brinjal, Broccoli, Cabbage, Capsicum, Carrot, Cauliflower, Chilli, Chow-chow, Cow pea, Cucumber, cucurbits, French Bean, Garlic, Knolkhol, Ladies Finger/ Okra, Lettuce, Musk melon, Pea, Pointed gourd, Pumpkin, Radish, Ridge gourd, Snake gourd, Spinach, Beet, Spine gourd, Sponge gourd, Tomato, Water melon
Tuber Crops	Potato, Sweet Potato, Tapioca, Colacasia, Yam, Kath alu
Spices	Coriander, Ginger, Chilli, Turmeric, Onion, Garlic, Black Papper, Cumin & Black Cumin, Mint, Fennel, Fenugreek, Bay leaf, Curry Leaf, Vanilla
Flowers	Marigold, Tuberose, Gladioli, Gerbera, Bougainvillea, Mussaenda, Chrysanthemum, Dahlia, Orchids, Antirrhinum, Aster, Balsam, Calendula, Carnation, Petunia, Portulaca, Salvia, Zinnia
Medicinal Plants	Amlakhi, Silikha, Bhumura, Bael, Nefafu, Brahmi sak, Maha Brhringaraj, Madhusoleng, Sarpagandha, Kalmegh, Neem, Safed Musli, Tulsi
Aromatic Plants	Citronella, Lemongrass, Vetiver, Patchouli
Nut Crops	Areca nut, Coconut, Cashew nut
Plantation Crops	Betel vine, Tea, Rubber, Coffee, Agar

Source: <http://assamagribusiness.nic.in>

Trend of Area, Production and Productivity of Horticultural crops in Assam:

There is a significant increase in area and production of horticultural crops in Assam during the last two decades. It is observed that although the area and production of fruits crops increased during the period of 2004-05 to 2011-12 by 19.12 percent and 22.70 percent respectively, the increase in productivity was almost negligible (4.40 percent). This might be attributed to existence of Bari system, use of traditional low yielding varieties and lack of adoption of improved technology. In case of vegetables, the area increased only 16.17 percent, production increased 20.76 percent and productivity 5.54 percent only during the period. In

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case of tuber crops, the increase in area, production and productivity was 6.67 percent, 13.10 percent and 6.43 percent respectively while, for spices, the increase was 15.31 percent, 16.94 percent and 2.09 percent against area, production and productivity. The trend of area, production and productivity of some of the major horticultural crops of Assam are given in Table-2

Table-2
Trend of Area, Production & Productivity of Horticultural Crops in Assam
from 2004-05 to 2010-11
(Area in lakh hectare, Production in lakh MT & Productivity in Kg. per hectare)

Sl. No	Crop	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	CGR(%)	
1	Fruits	Area	1.10	1.13	1.14	1.16	1.22	1.27	1.32	1.37	19.12
		Production	13.25	13.52	13.72	14.08	14.95	15.65	16.47	17.63	22.70
		Productivity	12,045	12,005	12,139	12,142	12,256	12,370	12,480	12,600	4.40
2	Tubers	Area	0.84	0.80	0.88	0.85	0.87	0.93	0.95	0.90	6.67
		Production	6.30	3.93	5.46	5.57	5.82	6.39	6.99	7.25	13.10
		Productivity	7,500	4,930	6,166	6,553	6,690	6,871	7,327	8,015	6.43
3	Vegetables	Area	2.23	2.32	2.36	2.38	2.42	2.51	2.60	2.66	16.17
		Production	36.61	38.18	38.87	39.18	40.52	42.55	44.70	46.20	20.76
		Productivity	16,417	16,485	16,469	16,462	16,744	16,952	17,192	17,380	5.54
4	Spices	Area	0.83	0.86	0.86	0.88	0.90	0.94	0.97	0.98	15.31
		Production	2.06	2.12	2.14	2.18	2.24	2.35	2.45	2.48	16.94
		Productivity	2,482	2,475	2,476	2,478	2,490	2,505	2,530	2,535	2.09

Source: Department of Agriculture, Govt. of Assam

From the table-2 it was seen that the compound growth rate (CGR) of area and production was highest against fruits followed by vegetables, spices and tuber crops. In case of productivity, calculated CGR was highest against tuber crops (6.43 percent) followed by vegetables (5.54 percent), fruits (4.40 percent) and spices crops (2.09 percent).

During the 11th five year plan period, maximum focus was laid on raising the productivity of various commercially important horticultural crops through extensive use of improved technology, management inputs and planting materials also together with the handling post harvest setting up of collection centre's with grading and transport facilities, marketing and processing, involvement of private sectors more particularly for contractual farming and buy back arrangement are also being considered as prime area of intervention. The government of Assam has targeted to increase the area, production and productivity of different horticultural crops during the 12th plan period and is shown in Table-3

Table-3
Target of Area, Production & Productivity of Horticultural Crops
during 12th Plan Period

(Area in lakh hectare, Production in lakh MT & Productivity in Kg. per hectare)

Crop		2012-13	2013-14	2014-15	2015-16	2016-17
Fruits	Area	1.40	1.45	1.50	1.55	1.60
	Production	17.70	18.45	19.30	20.15	21.10
	Productivity	12,625	12,730	12,850	13,000	13,200
Spices	Area	1.05	1.10	1.15	1.20	1.25
	Production	2.70	2.85	3.00	3.20	3.40
	Productivity	2,570	2,600	2,630	2,665	2,700
Potato	Area	1.10	1.20	1.30	1.40	1.50
	Production	9.35	10.45	11.70	12.90	14.25
	Productivity	8,500	8,700	9,000	9,200	9,500
Vegetables	Area	2.85	2.90	3.00	3.05	3.10
	Production	50.05	51.30	53.45	54.70	56.00
	Productivity	17,560	17,690	17,810	17,940	18,060

Source: Department of Agriculture, Govt. of Assam

Horticultural sector has established its credibility in improving land use, promoting crop diversification, generating employment and providing nutritional security to the people besides supplementing to their income. Apart from these, it also help in maintaining the ecological balance and produces increased biomass per unit of area as well as increases the aesthetic value.

Problems of Horticultural crops in Assam:

Assam has the potential for development of horticulture with its wide range of topographical and agro-climatic variations; it is yet to become a commercial venture. Factors hindering the horticultural development in the state are as follows:

- a) **Poor cultivation practices and low yield:** General neglect and non-adoption of scientific cultivation practices are the major constraints for poor return from most of the horticultural crops in the state. Despite conducive environment, the productivity and growth of all horticultural crops are lower than the all India average.
- b) **Lack of marketing facilities:** Due to lack of organized marketing structure the farmers are getting low return as compared to their counterparts in other states of India, whereas the middlemen amass a large chunk of profit at their expenses. For almost all the commodities including specialized product like citronella oil, the producers face considerable marketing problems. Due to perishable nature of

products and absence of adequate market support, the farmers sell their product at a low price to the middleman without even getting the opportunity to display them. Transportation and storage is perhaps the most serious constraints in the horticultural development of this region.

- c) **Lack of desirable planting material:** The disease free, true to type genuine planting material is absolutely lacking in case of a number of horticultural crops. It is imperative to generate disease free and healthy planting materials and screening of planting materials before its distribution is of utmost importance.
- d) **Scarcity of trained manpower and extension support:** Scarcity of trained manpower and inadequate extension support is one of the problems of horticultural development in Assam. But the counter part of the country like Punjab, Himachal Pradesh, Haryana etc., where the extension services are very much efficient, their pace of progress is also seen to be quite impressive.
- e) **Problems of processing:** For a state like Assam, the success of fruits and vegetables growing is closely linked with the availability of processing facilities. The processing industry can help to a certain extent in sorting out the problem of proper disposal of perishable commodities. Till today, there are a few number of cold storage facilities available, few processing units exist but are not functioning up to the desired capacity. Use of appropriate pre and post harvest practices for horticultural crops is vital for the success of the crops and also to garner good returns. Unfortunately, this is one of the weakest areas in the entire region.
- f) **Absence of adequate insurance coverage:** Risk management in horticultural crops is almost non-existent although the crops like onion and potato are covered under the National Agriculture Insurance scheme. There is a need to cover the risk in case of other horticultural crops as well, perhaps on the basis of potential production coverage instead of average yield. This would encourage higher investment to achieve higher productivity.
- g) **Inadequate Investment on Research:** Investment on research in horticulture has always remained low when compared to the large number of crops it covers. As a result many more financial issues remain unexplained for years together. There is an urgent need to increase the level of investment on research front.
- h) **Long Gestation period:** Since horticultural crops more especially plantation crops have long gestation period and the cost of establishment of such plantation is very high. It is impossible for marginal farmers to go for such ventures without long term credits financial institutions. Nationalized banks do not find it a favorable investment and are not sure about the recovery of loans because the existing land tenure system particularly in the tribal belts, does not permit land mortgages in favor of lending banks. Apart from these, the farmers are not tuned to the idea of considering agriculture as a business proposition and are not accustomed kitty-gritty of the bank loans. Thus, until and unless the system is changed, the needed financial investment will not be forthcoming.

Few major bottlenecks of horticultural development are as follows:

- a) Inadequate thrust of conservation and exploitation of horticultural germplasm.
- b) Lack of funds and financial support from Government for purchase of quality seeds/planting materials and other inputs.
- c) High rainfall, soil erosion and high rate leaching of nutrients.
- d) Heavy infestation of weeds, insect-pests and diseases.
- e) Lack of awareness of needed information.
- f) Absence of irrigation and fertilizer.
- g) Farmers are illiterate.
- h) Horticultural schemes under National Horticulture Mission (NHM) are never equally spreading in the state. etc.

Prospect of Horticulture crops in Assam;

Assam has emerged among the top states, particularly in expansion of area under plantation crops, in the horticultural sector. The Impact Evaluation Report of Horticulture Mission for North East and Himalayan State (HMNEH) during centre's 11th plant, places Assam in the top in area expansion under plantation crops like coconut by 43 percent share among the 11 states of North-East and Himalyan states. Similarly, in expansion of area under replacement/rejuvenation of senile plantation like orange, citrus etc., Assam is at the top with a share of 25 percent. The state also topped the list in total additional area under horticulture crops since 2009-10, with a 13 percent share among 11 states of North-East and Himalyan states. Assam secured second position in expansion of aromatic plants, viz 13 percent and spices 16 percent. In expansion of area under floriculture, fruits crops and medicinal plants, Assam got third position registering 12 percent, 12 percent and 10 percent of share respectively.

Assam is traditionally horticultural state due to its unique agro-climatic conditions which permit growing of a wide range of horticultural crops occupying 5.75 lakh hectares out of a gross cropped area of 40.99 lakh hectares. It is only 14.04 percent of the total gross cropped area of the state but has now become a hub of horticultural activities with sole objective of commercialization. Although, the state of Assam has enormous potential for development of horticulture the state is yet to harness the potentiality. In a flood prone state like Assam where productivity of major crops like rice is not stable, increase in production of horticultural crops can minimize the shock of crop failure and provide monetary security to the farmers. It is possible to exploit the untapped potential of the region through adoption of scientific technologies. There is ample scope of increasing the area under sweet potato, Assam lemon, guave, jackfruit and banana. Most of the existing orange orchards in the state are of either seedling origin or of inferior variety except for some orchards. These are to be replaced with suitable high yielding varieties. Though pineapple performs fairly well, growers are still unable to get good returns due to non-adoption of improved package of practices. Hence, there is need to adopt high density orcharding and method of induction of flowering in pineapple. Jackfruits can be used as fruit, vegetable and animal feed. The existing trees are of seedling origin and have wide variability. Thus there is need for selection of superior clone and its multiplication through the vegetative method of propagation. Papaya is also having good potential in the state, which is mostly grown in backyard garden, and no compact orchard exists. Since the same set of papaya is being grown for several years, it has resulted in to large mixed population which

needs purification. The scheme of Technology Mission for Integrated Development of Horticulture in Assam is in operation since 2001-02 with overwhelming response from the farmers. In spite of infrastructural problems, the state has started achieving the desired targets in case of fruits, flowers and other commercial crops. Strengthening production base, quality improvement, better price to growers, market access, value addition have become imperative for the farmers of the state and the Department of Agriculture is trying to touch upon all these issues under the Mission. The North Eastern India particularly Assam has special significance so far as its horticultural crops are concerned. It is contemplated to double the horticultural production in next 15 years through horizontal and parallel strategies but that is not enough. Assam has to utilize its competitive and comparative advantages through commercialization and make horticulture highly rewarding. Employment generation and nutritional security through horticulture are some other areas of interest. It is expected that the comprehensive approach through Horticulture Technology Mission will help to transform the entire gamut of horticulture in Assam in the next few years.

Recommendation:

After analyzing the prospects and problems of Assam on the basis of the secondary data the following measures are recommended for the development of horticultural crops in Assam:

- a) Through the development of infrastructure and transport services of Assam marketing facilities should be improved.
- b) Scientific cultivation practices should be applied in major horticultural crops in Assam.
- c) Disease free, true to type genuine planting material should be provided to the farmers.
- d) Farmer should be trained up.
- e) More fruits and vegetable processing industries should be established in the state.
- f) More funds are to be sanctioned/ released to both the department and the farmers by the government of India and government of Assam.
- g) More financial institution should be established in the state.
- h) Awareness programmed may also be conducted to the farmer on importance of horticulture industry in recent time.
- i) Research on horticulture, it is needed to increase investment.
- j) There is need to establish a full fledged Horticulture department in Assam, which is presently working with under the department of agriculture, Government of Assam. etc..

Conclusion:

The world today depends on integration of markets; we still have plenty resources market can survive only when goods like fruits and vegetables are made available, opening up of trade. Duties free on agricultural goods free exit and free entry of high value crops would help the rural economy to grow. Still many rural people are deprive of fruits and vegetables Consumption due to poverty the fresh horticultural products are becoming a food and diet only of the rich but once farmers were made to produce for themselves and for market, fruits and

vegetables prices would get reduces and all section of people can enjoy it and maintain a good dietary pattern and keep up better health. Improvement of road and transportation would automatically boost horticultural sector in the coming decades and make profitable income out of this horticulture in the state of Assam and North-East as a whole. This climax will benefit the country as a whole with enough of horticultural produces i.e. Second Golden revolution the way sooner or later rural India will shine and India can becomes a leader in the world of trade liberalization.

Bibliography:

1. Daimari ; P.(2007) Five year plans and Industrialisation in Assam, *EBH Publishers (India) Guwahati*.
2. Saha, N (1973) The Economics of Shifting Cultivations in North-East India.
3. Government of India - Food Processing Industries in India, Ministry of food Processing Industries, Govt. of India.
4. Dhar.P.K. India Economy. *Kalyani Publishers*.
5. <http://www.archaeology.about.com/od/hterms/g/horticulture.htm>.
6. <http://www.landscape.about.com/cs/g/horticulture/htm>.
7. Baseline Data on Area, Production and Productivity of Horticulture Crops, Dr. Moromi Gogoi , Sri Debajit Borah

Sustainable Farm Management : The Pro-Poor Policy Prospect

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Abstract:

Taking into consideration of Farm importance for the current initiative of sustainable development, government has rightly maintained 60% of total expenditure under the much enthralled MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act), 2005. In order to make MGNREGA useful for agriculture, department of rural development, government of India explained, 60 percent of expenditure under the scheme should be for agriculture and allied activities (www.epw.in/system/files/pdf/2016/16/Rural_Push_in_Budget_2016-17, The Financial Express, 9th February, 2016). The core focus of MGNREGA works relates to agriculture and agriculture allied activities, especially to diversify the fisheries, horticulture etc. Since its inception till December 2014 approximately 57% of total MGNREGA expenditure is done on agriculture and its allied works in the country. MGNREGA with its various dynamic activities and convergent approaches of one decade implementation has started and completed good number of Agriculture and its allied works all over the rural areas of the country. This pro-poor initiative is the complete real beginning of Farm management for sustainable agricultural development.

Selecting randomly the sample Morigaon district of Assam, this paper has studied the workings of MGNREGA and its management approaches in the sense of enhancement and restoration of agriculture development. How MGNREGA has been working for the Farm management in the state Assam' is the prime objective of the study. Using SPSS (22) and related graphical representations, our study has analyzed the positive impacts of MGNREGA in agriculture development inspite of having dozens of negative impacts in labour supply, labour skill, public investment in agriculture etc.

Keywords: Agriculture, Asset Creation, Development, Management, Policy etc.

Introduction:

Farm management refers to management of all the necessary input devices of a farm at an optimum level to derive the maximum possible output. In case of agriculture, without harming the natural resource base deriving agricultural output at the maximum extent is known as agricultural farm management. Sustainable agricultural farm management is a long term systematic process which include change in the basic structure of an agriculture base economy to generate more in the future as well as the present.

Agricultural Farm Management is necessary, because

- Farm management in agriculture with respect to production, productivity, cost, marketing, labour supply etc is necessary because the traditional basic economic foundation of the country as well as the state is based on it. This is sensitive because traditionally the sector is based on nature.
- Precious water, costly technology and chemicals are used by the farmers for the enhancement of farm production.
- Question of total employment, disguised unemployment and profitability are very much related with the farm sector.
- Sustainable development is the prime objective of present economic development
- With respect to it's coverage, number of people engaged, peoples' use behaviour of it's output- the ultimate growth and development of Indian economy is based on the agricultural farm practices and it's management processes.

In the form of policy practice

MGNREGA, 2005 is engaged in drought proofing, flood control, land development & plantation, water harvesting and storage of water for agriculture development. Through effective application of field channels, pressurized irrigation, water lifting devices etc. MGNREGA is rightly engaged and trying to enhance the potential of farming systems.

MGNREGA is an Act to provide livelihood security to the households in rural areas of the country by providing at least one hundred days of guaranteed unskilled wage employment in every FY to every demanded household. More than 60% of total MGNREGA fund is spent on agriculture and it's allied activities in the last FY (Financial Year) in the country.

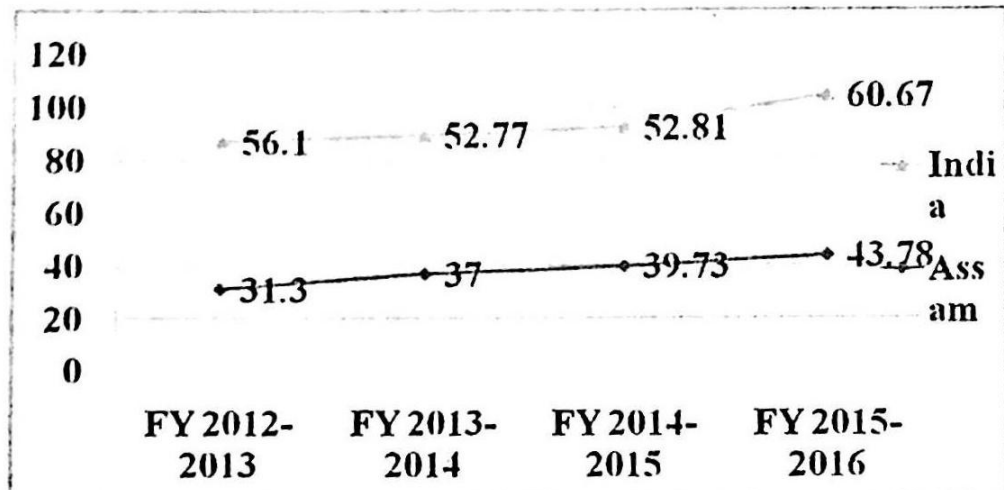
Table-1:**National overview of expenditure on Agriculture & it's allied works since inception**

	Expenditure (%)
On agriculture works	52
On agriculture allied works	5
Total on agriculture and agriculture allied works	57

Source: MGNREGA site, May 2016

Percentage of MGNREGA expenditure in agriculture and its allied works in the country as a whole and the state of Assam is explained in the following figure-1. In the country more than 60% of total MGNREGA expenditure is done for agriculture related works. Though the trend of expenditure is less but it is rising in Assam.

Figure-1: MGNREGA expenditure for Agriculture and its allied works (%)



Several lakhs of assets are already created under MGNREGA in the country. Total 5 Lakh farm ponds and 10 Lakh Vermi compost pits to be constructed in the country in the FY 2016-17. MGNREGA has been creating sustainable assets and generating sustainable rural livelihoods through the expansion of natural resource base, augmenting productivity and supporting the rural economy of the country.

Let us see few prominent explanations that links MGNREGA with agriculture

- MGNREGA Sameeksha-II (2015) explained about a survey conducted in Andhra Pradesh. It mentioned that Erragutta Block has become a model block for the entire Chittoor district of Andhra Pradesh. By dovetailing funds from MGNREGA, the Integrated Watershed Management Programme and the AP Micro Irrigation Project, the entire extent of barren land of 45 hectares has turned into a well-developed mango orchard. Each of the beneficiaries got benefit of Rs 8,000 to Rs 10,000 from the first year's yield. Intercrops like ground nut, millets, watermelons and tomatoes have also been taken up. It explained that the process has transformed the lives of the poorest of the poor by changing their status from agricultural labourers to proud owners of orchards.
- Swaminathan, M.S. (2009) the father of Green Revolution assessed that the MGNREGA holds the trigger for 2nd green revolution from the rain-fed areas, by using water conserving technologies and working with the smaller and poorer farmers.
- Sanju & Pellissery (2011) found that MGNREGA provides an opportunity to make uncultivable lands cultivable and to increase food access due to watershed management activities.
- Tomar and Yadav (2009) explained that due to impressive participation of women in MGNREGA leads to improvement and security in the use and consumption of food items among the rural poor.

Primary objectives of the study

- ❖ To assess, how MGNREGA helps and tries to manage the growth and development of agriculture sector.
- ❖ To assess the type of assets created under MGNREGA in Assam and the Morigaon district of Assam for the growth and development of Agriculture sector.

Data collection and methodology used for the study

Broad area of data collection for this research is the entire state of Assam. We have taken specifically Morigaon as a representative sample district. Data are collected from published and unpublished secondary sources like P&RD reports, Govt. of Assam; MoRD reports, GoI; MGNREGA site, different published write up and abstract volumes and papers, NGO reports etc. Data available through internet sources are also used for the study. Data are interpreted and analysed with tables, diagrammes and graphs using the computer based software SPSS (22).

Analysis and findings of the study

It is mandatory for MGNREGA to create sustainable environment friendly assets in the rural villages. Though different types of assets are already created in the state of Assam under MGNREGA but specifically we are giving importance to agriculture development related works. MGNREGA has created number of permanent assets for the growth and development of agriculture sector in the state of Assam during the last 10 years of it's implementation. MGNREGA has also created several assets in Morigaon district of Assam which are directly linked with Agriculture development. The total statistical package (simply for agriculture related assets created under MGNREGA) for the last four years in state of Assam and Morigaon district of Assam is explained bellow under different headings.

➤ Micro irrigation works for agriculture expansion and development

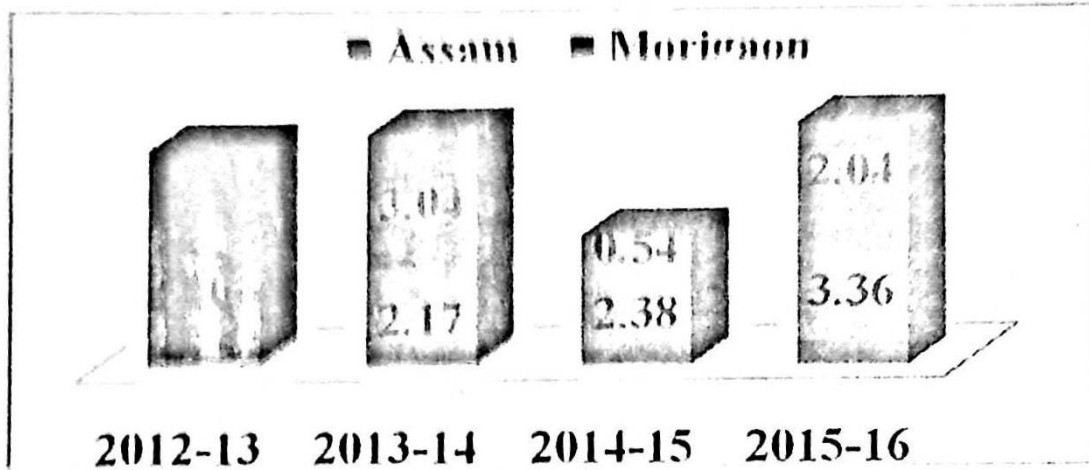
Due to heavy fragmentation of land for cultivation, micro irrigation works performs better for the development of agriculture sector in all the hill states of NE. The act has created largest number of micro irrigation works in the year 2012-13 in the state of Assam. In Morigaon district of Assam in 2013-14 MGNREGA has created largest number of micro irrigation works for the development of agriculture.

Table-2:
Assets created (% of total assets created)

	2012-13	2013-14	2014-15	2015-16
Assam	3.46	2.17	2.38	3.36
Morigaon	1.41	3.04	0.54	2.04

Source: MGNREGA site, May 2016

The same table is also explained with the help of the following Figure. As it is seen scenario is better in all Assam average.



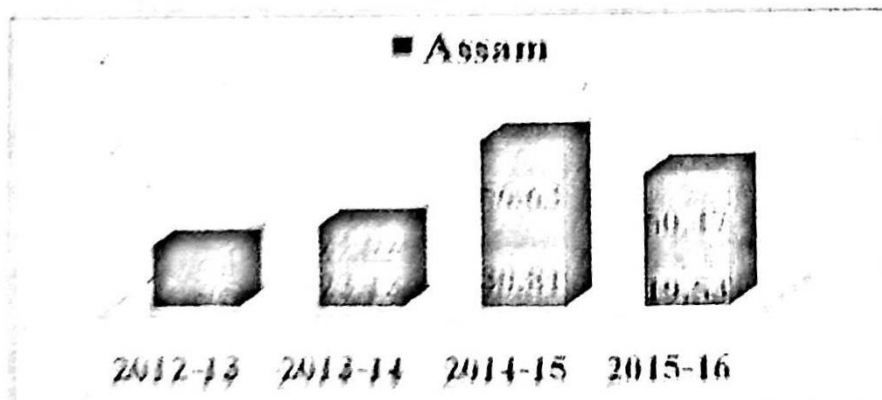
➤ **Drought proofing works to increase the production and productivity of agriculture**
 Interestingly number of drought proofing assets created under MGNREGA in Assam is much less than the Morigaon district.

Table-3:
Assets created (in % of total assets created)

	2012-13	2013-14	2014-15	2015-16
Assam	14.75	23.13	30.81	19.53
Morigaon	19.54	21.02	56.63	50.47

Source: MGNREGA site, May 2016

In Morigaon district number of drought proofing assets created is 50% of total assets created. Same is also explained with the help of the following figure.



Drought proofing assets created rightly helps in agriculture development.

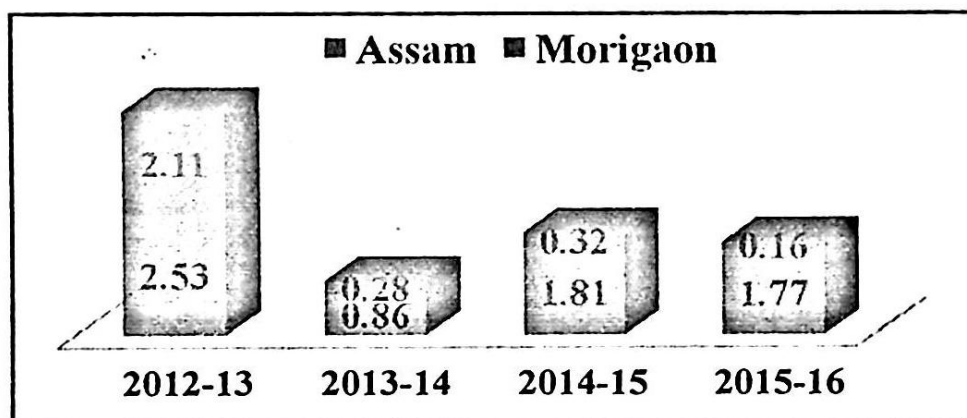
➤ Works to Repair, Renovate and Restore the traditional water bodies

Table-4:
Assets created (in % of total assets created)

	2012-13	2013-14	2014-15	2015-16
Assam	2.53	0.86	1.81	1.77
Morigaon	2.11	0.28	0.32	0.16

Source: MGNREGA site, May 2016

Water is the prime component of agriculture development. As a whole the state of Assam is based on traditional micro water sources for agriculture development and MGNREGA helps to repair, renovate and restore the sources. The above table is also explained with the help of the following figure.



➤ Water Conservation and harvesting works

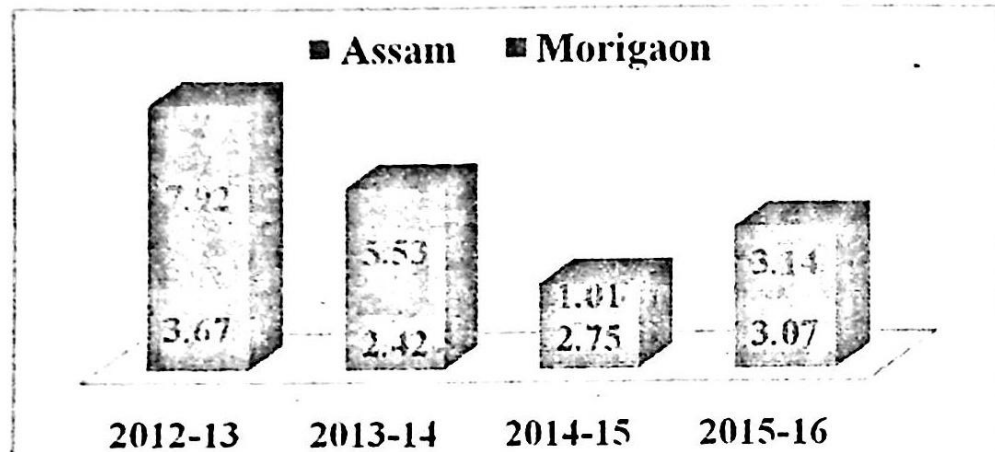
MGNREGA works in line with the proper use of scarce water resources. In 2015-16 MGNREGA has created 3.14% of water conservation and harvesting assets out of total assets created in the Morigaon district of Assam. Proper utilization of water helps in agricultural development. Scenario is explained bellow.

Table-5:
Assets created (% of total assets created)

	2012-13	2013-14	2014-15	2015-16
Assam	3.67	2.42	2.75	3.07
Morigaon	7.92	5.53	1.01	3.14

Source: MGNREGA site, May 2016

Above table is explained with the following figure.



➤ Flood Control & Management Works

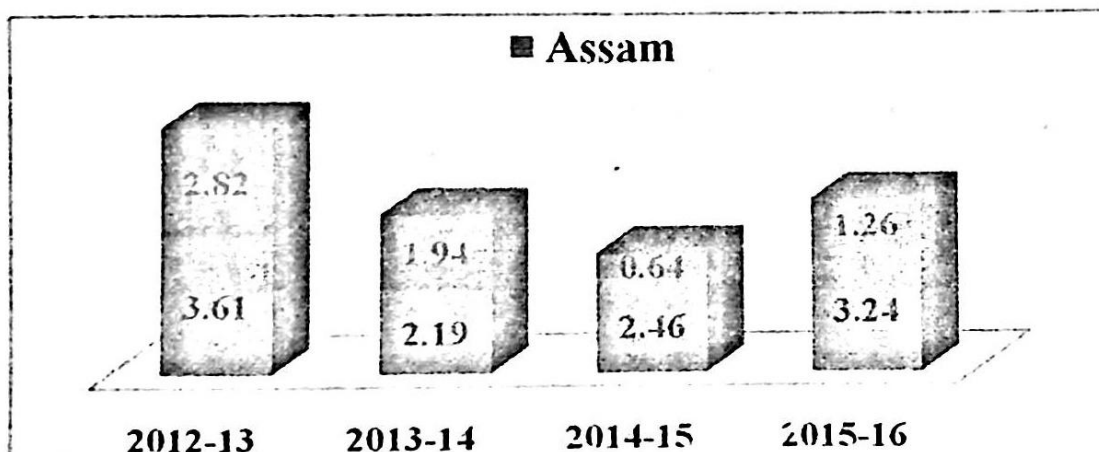
Repeated occurrence of flood is the greatest reason of miserable life in the form of destruction and at the same time it is the greatest reason of happiness in the form of rise in fertility of soil among the farmers. MGNREGA works to control and manage the occurrence the flood. MGNREGA trend to control and manage flood in Assam and Morigaon district of Assam is explain bellow.

Table-6:
Assets created (in % of total assets created)

	2012-13	2013-14	2014-15	2015-16
Assam	3.61	2.19	2.46	3.24
Morigaon	2.82	1.94	0.64	1.26

Source: MGNREGA site, May 2016

Above table is explained with the help of the following figure.



➤ **Land Development to rehabilitate degraded forests**

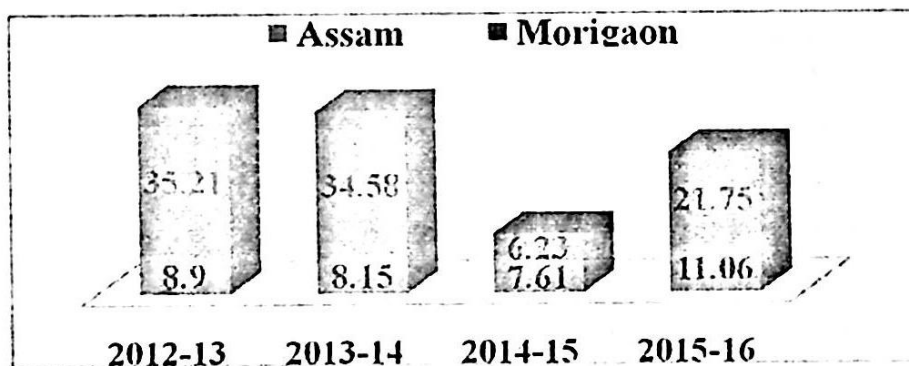
MGNREGA make ready the available lands to rehabilitate the degraded forests. In this regard Morigaon district of Assam is showing better performance than the state as a whole. It is explained with the help of the following table.

Table-7:
Assets created (% of total assets created)

	2012-13	2013-14	2014-15	2015-16
Assam	8.90	8.15	7.61	11.06
Morigaon	35.21	34.58	6.23	21.75

Source: MGNREGA site, May 2016

Same is explained with the following figure.



➤ **Fisheries development works**

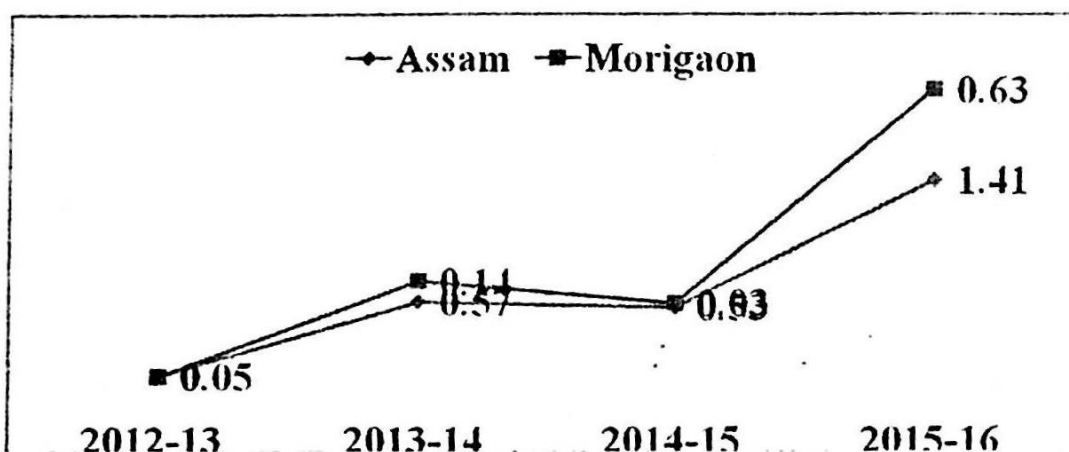
Development of fishery sector is one of the prime objectives of agriculture development. With rivers and big water reservoirs potential scope of fishery sector development in Assam is very high. Though in this regard MGNREGA has done very little but the act has started the process. Scenario both for Assam as a whole and Morigaon district of Assam is explained below.

Table-8:
Assets created (in % of total assets created)

	2012-13	2013-14	2014-15	2015-16
Assam	0.05	0.57	0.53	1.41
Morigaon	00	0.14	0.03	0.63

Source: MGNREGA site, May 2016

The trend of fishery sector development is explained with the following curves. For both Assam and Morigaon district the trend is upward.



Besides assets created, MGNREGA works catalyse agricultural development through

- The growth in the use of agricultural inputs due to increase in household earnings through MGNREGA employment and wage.
- Growth in the consumption of local agricultural outputs due to increase in household earnings through MGNREGA employment and wage.
- Expansion of activities relating to enhancement of horticulture production due to increase in MGNREGA income.
- Improvement and expansion in soil conservation activities.
- Afforestation Programmes undertaken all over the country.
- Inclusion of additional land area under irrigation and cultivation. Etc.

Thus MGNREGA has done a lot for the development and management of agriculture sector in the state of Assam and the Morigaon district of Assam.

- ✓ Most works and assets created under MGNREGA contribute directly as well as indirectly for the development of agriculture sector. MGNREGA creates green and decent jobs that ensure sustainability and enhance agricultural productivity.
- ✓ With large-scale investment directly into the village economy, the impact of MGNREGA on agricultural productivity is positive.
- ✓ Availability of water has led to change in crop pattern and increased area under cultivation.
- ✓ Due to renovation of traditional water bodies and construction of ponds under MGNREGA production of commercial crops are getting started in the rural villages.
- ✓ Water-related assets created under MGNREGA have increased the number of days in a year water is available and also the quantity of water available for irrigation.

Convergence of MGNREGA with agriculture and its allied sectors is possible across the value chain- during Pre-production, Production and Post harvest. Convergence of MGNREGS with agriculture may improve soil health, water conservation and productivity.

Policies Prescribed

- Care should be taken that adequate number of works from the different permissible works are incorporated in MGNREGA works.
- Needs to undertake seasonality based work plan. This will not only reduce the opportunity cost of working under MGNREGS but also help in generating output and employment.
- Team of management professionals who are possibly trained in rural management may be deployed, who can establish a synergy between the management theory and practice.
- To overcome the problems in demand front, in addition to other measures, the element of exclusion needs to be taken care of.

Conclusion

Prospect of managing the diversities and flexibilities in agricultural production and productivity through MGNREGA is high. MGNREGA works from land development to rural connectivity are interlinked with agriculture base rural communities. Actual management and prosperity will depend on peoples' understanding, cooperation and participation for implementation.

References:

- Deka. T (2010). The NREGS and Resilience Building for SD: A Case Study of Morigaon District, Assam. Commissioned Paper, Cotton College, Guwahati.
- en.wikipedia.org/.../Mahatma_Gandhi_National_Rural_Employment
- Hirway. I. (2006). Concurrent Monitoring of National Rural Employment Guarantee Act, Feedback from field. Centre for Development Alternatives, Ahmadabad: 5-8.
- Khera. R. (2008). Employment Guarantee Act. Economic and Political Weekly, Aug. 30, pp.8-10.
- UNDP (2015). MGNREGA Sameeksha-II, anthology of research studies (2012-14), Lodhi Estate, New Delhi.
- www.mgnrega.nic.in