



Tribal Sub-Plan Programme

ANNUAL REPORT

2016-2017

Improving Livelihood of Tribal Farmers Through Integrated Farming



ICAR-National Institute of Abiotic Stress Management

Malegaon, Baramati, Pune, Maharashtra, India 413 115

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**IMPROVING LIVELIHOOD OF TRIBAL
FARMERS THROUGH INTEGRATED FARMING**



**ICAR-National Institute of Abiotic Stress Management,
Malegaon, Baramati, Pune, MH, India 413 115**

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Director,
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Foreword

Tribal agriculture is characterized by primeval technology and low input resources and therefore, the agricultural productivity of various crops grown in the tribal areas is very low. In order to overcome these lacunas and effectively address every objective of the Tribal Sub Plan (TSP); on behalf of Indian Council of Agricultural Research, National Institute of Abiotic Stress Management (Malegaon, Baramati) constituted TSP implementation committee. This committee was constituted with multi-disciplinary scientists to undertake activities related to improved technology interventions in field crop, horticulture, dairy, goatery, poultry, fisheries and sustainable integrated farming for improving the livelihood of resource poor tribal farmers in various villages of Nandurbar District during 2016-17.

The multidisciplinary team of TSP analyzed the existing farming systems, identified the constraints and potentialities of target areas, then planned and implemented improved technology interventions in field crops, horticulture crops, dairy, goatery, poultry and fisheries, integrated crop-livestock-fisheries through the proper coordination among scientific team, targeted tribal society and other stakeholders.

The important activities related to implementation of improved technology interventions in integrated farming in terms of field and horticulture crops, dairy, goatery, poultry and fish farming and integrated agri-aquaculture, by NIASM in tribal villages of Navapur tehsil have been documented in this Annual Report. Information on livelihood improvement of tribal farmers is also provided. I thank the TSP Implementation Committee led by Dr KK Krishnani, who has made tremendous efforts for highlighting the significant achievements made under TSP for improving livelihood of tribal farmers. I also place on record my thanks to editorial members for contributing to this annual report.

(Narendra Pratap Singh)

Preface

Considering the physical, socio-economic limitations and all other facts, ICAR-NIASM, TSP Implementation committee decisively selected several villages of three different Tahsils of the Nandurbar District and accordingly, improved technology interventions in the Integrated farming system for livelihood improvement of tribal farmers was conceptualized.

Information related to advantages of integrated farming in terms of field and horticulture crops, dairy and poultry farming, IMC aquaculture and integrated agri-aquaculture, have successfully been disseminated through training programmes to the participated farmers. Organisation of training programmes helped tribal farmers of Navapur villages to get acquainted with technology interventions in rice, banana, fodder crops, farm pond preparation, Integrated agri-aquaculture and integrated farming. Distribution of vermicompost production units generated the concept of organic farming.

We express our deep sense of appreciation to all those individuals and institutions for extending their help and cooperation in implementing the TSP programme effectively. Not only the scientists and experts of the ICAR and Non-ICAR institutions, assistance and cooperation extended by MPKV (Rahuri), MSSC (Mahabeej), and KVK (Baramati, Babhaleshwar and Nandurbar) deserves special mention. We are thankful to our dedicated team members Shri Shrikant Karale (YP-I-TSP), Shri Kishan Gavit, Shri Vilas Vasave who have worked tirelessly in the field and were behind the conduct of various field demonstrations and organization of various HRD programmes.

Chairman
TSP Implementation Committee

Executive Summary

Integrated farming system is a sustainable farming technique, which aims to maximize the production in the cropping pattern and takes care of optimal utilization of resources as well as proper reuse and recycling of farm wastes. The present economic pressure for maximizing food production and minimizing the production cost with a general concern for energy conservation has led to an approach of integrating agriculture with animal husbandry and fish farming. The Nandurbar District is one of the tribal districts of Maharashtra, which offers a very conducive climate for growing variety of horticultural and plantation crops. Major field crops are paddy, kharif and rabi jowar, bajara, wheat, tur, soybean, gram, groundnut, cotton, sugarcane etc. Major fruit crops are mango, banana, papaya, ber, custard apple, anolla, guava, sapota, pomegranate, tamarind etc. The important vegetables grown in the district are onion, tomato, brinjal, beans, okra and pumpkin. The farmers concentrate mainly on crop production, which is subjected to a high degree of uncertainty in income and employment to the farmers. In this contest, it is imperative to evolve the suitable strategies for augmenting the income of a farm. Integration of various agricultural enterprises viz., cropping, animal husbandry, poultry, fishery and integrated agri-aquaculture has great potentialities in stabilizing agricultural economy. In this direction, ICAR-NIASM has implemented improved technology interventions in field crop, horticulture, livestock, poultry, fisheries and integrated agri-aquaculture in several villages of Navapur, Nandurbar, and Dhadgaon Tehsils in Nandurbar District for improving the livelihood of resource poor farmers as part of Tribal Sub-Plan (TSP) programme. Undertaking several agricultural and its allied activities not only provide stability of income to the farmers, but also create additional employment opportunities in the rural areas for a whole year. Various training programmes, to leverage understanding of farmers about the technology interventions were conducted for improved cultivation of rice, sugarcane, banana, onion, fodder crops; kitchen gardening of dragon fruit; dairy, goatery, backyard poultry, fish farming, and integrated agri-aquaculture. Also, field days and exposure visits showcasing these improved technological interventions were organized for farmers. The integrated farming approach involving fish culture with livestock and/or cash crops, has a considerable potential for augmenting productivity, generation of rural employment and improvement of socio-economic condition of the farmers. Improved technology interventions led to higher production

and marketable yield of rice (4-6 tonnes/ha), Sugarcane (40-75 tonnes/acre), onion (25-68 tonnes/ha), banana (15,000-27,000 kg/acre), baby corn (4 tonnes/acre), milk (108 - 188 Litres/month), and fish (>3000 kg/ha). Improved technology interventions in goat farming as backyard enterprise and dragon fruit cultivation as kitchen gardening are also being undertaken for livelihood improvement of tribal farmers.

About The Tribal Plan

Nandurbar, primarily a tribal district is characterized with diverse topography, and rainfed agriculture. The area under cultivation is 2,53,413 hectares with crops taken in Kharif and Rabi season in approximately 800 villages and 130 villages, respectively. Availability of water during summer is a major concern in some of the villages. Overall, water is a limiting factor because of which productivity of crops is low and cropping pattern is of low value cereals. From the soil sample analysis, it is observed that the district has large area under light soil with low to medium nitrogen availability, low phosphorus and very high amount of available potassium. ICAR-National Institute of Abiotic Stress Management, Malegaon Kh., Baramati has purposefully selected Nandurbar district for livelihood improvement of tribal farmers through improved technology interventions in field crops, horticultural crops, livestock, poultry, fisheries and integrated agri-aquaculture. In order to focus each aspect of objectives of the Tribal Sub-Plan, multi-disciplinary committee was constituted, to serve as pillar of the bridge between the tribal farmers and improved livelihood through sustainable agricultural development.

TSP implementation committee

Scientist	Designation	Specific contribution
Dr NP Singh	Director, ICAR-NIASM, Baramati	Guidance and Monitoring of TSP activities related to implementation of improved technology interventions in Integrated Crop-Livestock-Poultry-Fisheries
Dr. KK Krishnani	Principal Scientist (Agricultural Chemicals) I/c-Head-School of Edaphic Stress Management	Implementation of Improved technology interventions in field crops, horticulture crops, livestock, poultry, fisheries and Integrated Agri-aquaculture; Organization of training programmes, Field Day, Exposure visits and group meetings.
Dr. NP. Kurade	Principal Scientist (Veterinary Pathology)	Implementation of Improved technology interventions in livestock and poultry: Organisation of training programmes related

		to dairy farming and goat rearing techniques, breeding and disease management.
Dr. DP Patel	Principal Scientist (Plant Physiology)	Implementation of Improved technology interventions in field crops (Rice and Sugarcane); Organization of farmers field day/ training programmes on Four-point rice production technology.
Dr. AL Kamble	Scientist (Agricultural Economics)	Implementation of improved technology interventions in field plant crops and livestock; Impact assessment of technologies disseminated to tribal farmers; Marketing strategies related to plant crops and livestock
Dr RL Meena	Scientist (Agronomy)	Assistance in integrated nutrient management in horticulture crops
Dr Neeraj Kumar	Scientist (Fish nutrition)	Implementation of improved technology interventions in IMC aquaculture
Dr AV. Nirmale	Chief Technical Officer (Animal Nutrition)	Training of farmers and assistance in Implementation of improved technology interventions in livestock and poultry.

Based on the resource assessment, characterization and baseline survey carried out in the tribal areas of different Tehsils of Nandurbar District, concentrated efforts were taken up by the TSP Implementation Committee to help generate additional income by the small and marginal farmers and landless labours from major field and horticulture crops besides subsidiary occupations/other allied activities including dairy, goatery, poultry, and fisheries. Tribal farmers from three different Tehsils were adopted after consultation with the tribal council and village captains to improve the farming system through integrated farming system approach.

Socio-economic profile of the identified tribal area: Nandurbar District

The district headquarter of Nandurbar District is Nandurbar, which is in the North western side of Maharashtra State. Nandurbar district is the 4th largest Tribal District of Maharashtra, where 69.30 per cent population is Tribal. Nandurbar district is bounded to the south and south-east by Dhule district, to the west and north is the state of Gujarat, to the north and north-east is the state of Madhya Pradesh. The northern boundary of the district is defined by the great Narmada river. The district comprises 6 tehsils namely Akkalkuwa, Akrani Mahal (also called Dhadgaon), Taloda, Shahada, Nandurbar and Navapur. Maharashtra Government has recently identified 10 districts as vulnerable to climate change, out of which Nandurbar as most vulnerable district to be affected by climate change in the coming decades. The Climate of Nandurbar District is generally hot and dry. Summer is from March to mid of June. The Monsoon sets in during the mid or end of June till October. During this season the weather is usually humid and hot. The average rainfall is 859 mm in the district. The main crops grown in Nandurbar District are Jowar, Wheat, Rice, Toor, Groundnuts, Cotton and Chilly.



Agro-climatic zones of Nandurbar district

S.No.	Agro-climatic Zones	% Area	Tahsil
1	Scarcity Zone	42.04	Nandurbar, Taloda, Akkalkuwa, Akrani
2	Western Ghat Zone	19.40	Navapur
3	Sub-mountain Zone	25.70	Akrani (Dhadgaon) & northern parts of Akkalkuwa.
4	Western Maharashtra Plane Zone	12.86	Taloda Shahada

- Area under cultivation: 2,53,413 Ha.
- Crop Pattern Kharif: Approx. 800 villages
- Rabi: Approx. 130 villages
- Annual crops: Sugarcane and cotton.
- Fruits: Mango, Custard Apple, Banana.

Tehsil wise Total and Tribal Population of Nandurbar District (as per 2011 Census)

District	Tehsil	Total Population, (Nos.)	Tribal Population, (Nos.)	% Tribal Population
Nandurbar	Taloda	159654	123634	77.44
	Akrani/Dhadgaon	195754	187806	95.94
	Akkalkuwa	245861	209586	85.25
	Nandurbar	367446	167431	45.57
	Navapur	271852	232501	85.52
	Shahada	407728	220975	54.20
Average Tribal population				69

Project Details

Project Title: Improving livelihood of Tribal Farmers through Integrated Farming

The traditional livestock and fish farming in the Nandurbar District were highly primitive. The major constraints for livestock and poultry production in these areas are lack of improved breeds. Vast stretches of grazing land and existing livestock-based economy are in tune with the available agro-ecological situation. With this plus point of natural resources there is tremendous scope for animal husbandry and fisheries in the upliftment of livelihood and economic condition of the tribal families. Allied activities such as dairy, poultry, fisheries and aquaculture, sericulture play a very limited role in Nandurbar. Therefore, diversification and improvement of agricultural production along with household based other off-farm activities such as backyard farming / kitchen gardening supported by technological innovations should be the strategy to improve the livelihoods in these areas. Therefore, it was necessary to encourage these activities to provide supplementary incomes to the farmers.

Objectives

Considering the physical, socio-economic limitations and all other above facts, ICAR - National Institute of Abiotic Stress Management, Baramati has purposefully selected various villages of three different Tehsils of the Nandurbar District and accordingly, improved technology interventions in integrated farming for livelihood improvement of tribal farmers was conceptualized with the following objectives:-

1. Disseminating improved technology interventions / technologies for agricultural diversification in major field and horticulture crops, livestock (Dairy, Goat farming), poultry, fisheries and aquaculture for livelihood improvement of tribal farmers
2. Enhancing livelihood and nutritional security in the tribal areas through the introduction of suitable crop varieties/animal breeds/fish species and production technologies
3. Disseminating improved technology interventions in integrated Crop-Livestock-Fisheries
4. Development of household based other off-farm activities including backyard farming / kitchen gardening supported by technological innovations through value addition for income diversification.
5. Organising training programmes / exposure visits / field day / workshops related to improved technology interventions in field & horticulture crops, livestock, poultry and fisheries

Strategies for tribal farming system improvement

Following six strategies were adopted by TSP implementation Committee for improving tribal farming system in Nandurbar District:-

- Input support/Introduction of suitable high yielding varieties / animals breeds / fish species
- Implementation of improved technology interventions in Integrated Crop-Livestock-Poultry-Fisheries
- Capacity building
- Assessment and mitigation of abiotic and biotic stresses
- Agricultural diversification, and value addition,
- Improvement in water productivity within the tribal social system

Sub-project	Objectives	Activities
Improved technology interventions in field crops	Improved technology interventions in rice	<ul style="list-style-type: none"> • On-farm demonstration of “Four point rice production technology” • Yield performance of rice variety Indrayani and Phule samridhi • Organization of farmers field day on rice crop • Farmers training programmes on Four point rice production technology
	Improved technology interventions in sugarcane	<ul style="list-style-type: none"> • Demonstrations on “Water efficient crop production technology in sugarcane” • Organization of farmer’s field day on Sugarcane crop
Improved technology interventions in horticultural crops	Improved technology interventions in dragon fruit	<ul style="list-style-type: none"> • Distribution of dragon fruit cuttings/saplings for kitchen gardening / Backyard farming
	Improved technology interventions in onion	<ul style="list-style-type: none"> • Onion nursery raising in tribal areas • Transplanting of onion seedlings • High yielding and long storage varieties of Rabi and late kharif onion
	Improved technology interventions in banana	<ul style="list-style-type: none"> • Cultivation of Virus free tissue culture banana

Improved technology interventions in livestock	Improved technology interventions in dairy	<ul style="list-style-type: none"> • Nutritional management in livestock for livelihood improvement of tribal farmers • Deworming and mineral mixture supplementation • Training about parasitic disease of livestock and poultry and its management
	Improved technology interventions in goatery	<ul style="list-style-type: none"> • Training programmes for imparting skill and knowledge of goat rearing techniques, management, feeding, breeding and disease management, insurance, bank loans • Establishment of 44 goat farm units, each consisting 4 female and 1 male goat.
	Improved technology interventions in backyard poultry	<ul style="list-style-type: none"> • Group meetings with tribal farmers on “Backyard Poultry Farming” • Each of selected 150 tribal farmers, was provided with 20 Giriraja birds along with fabricated cages, feeders, waterers and feed for initial month.
Improved technology interventions in fisheries and aquaculture	Improved technology interventions in IMC aquaculture	<ul style="list-style-type: none"> • Demonstration of Farm pond preparation • Distribution and stocking of IMC seeds • On farm demonstration of measurement of water quality parameters • Nutritional management in fisheries for livelihood improvement of tribal farmers • Fish and prawn farming and their management • Method for Fish feed formulation and preparation • Organization of farmer’s field day on fish culture
Improved technology interventions in Integrated farming	Improved technology interventions in field & horticulture crops, livestock, poultry and fisheries	<ul style="list-style-type: none"> • Integrated Crop-Livestock-Fisheries • Integrated Livestock cum Fish farming • Integrated Goat cum Fish farming • Integrated agri-aquaculture

Organisation of Research/Extension work

Multidisciplinary team/TSP implementation committee analyzed the existing farming systems, identified the constraints and potentialities of target areas, then planned and implemented improved technology interventions in field crops, horticulture crops, dairy, goatery, poultry and fisheries, integrated crop-livestock-fisheries through the proper coordination among scientific team, targeted tribal society and other stakeholders in the following SIX steps

1. Socio economic analysis and selection of farmers for distribution of inputs.
2. Identification of technologies for improving the productivity and diversification of existing farming system.
3. Development of household based other off-farm technologies
4. Development of entrepreneurship among the potential tribal farmers through agricultural diversification strategies for nutritional security.
5. Technology dissemination
6. Periodical review/Monitoring for formulation of developmental strategies and improvement

Improved technology interventions

Improved technology interventions in field crops

Productivity of rice and sugarcane is far below in Nandurbar district as compared to other parts of Maharashtra. Therefore, four point rice production technology and water efficient crop production technology in sugarcane were demonstrated to tribal farmers. A large number of villages in Navapur Tehsil of Nandurbar district were surveyed and farmers were contacted for demonstration of improved technological interventions in rice crop. Tribal farmers from various villages namely; Chitavi, Vadsatra, Devlipada, Neemdarda, Bandharpada, Gadad and Bokajhar, were selected for making on-farm demonstration of “Four point rice production technology” on farmers field. Certified seed of high yielding rice variety (Phule Samrudhi) were distributed to >100 selected farmers from these 6 villages. Rice nursery has been raised by all the farmers and seedlings 25-30 days of age were transplanted in one acre area each. During meetings held with various group of farmers, detailed information related to pre-sowing seed treatment, raising of healthy and water efficient rice nursery were given to the farmers. Participatory demonstration of “Four point rice production technology” have successfully been implemented. In addition, plantation of Gliricidia has been promoted among the farmers

selected for rice crop intervention as live fences, which can also be used as green leaf manure for crop production and animal forage.



During farmers field day, crop cutting from 1.0 meter x 1.0 meter was also done in presence of farmers for assessment of yield performance of rice variety Phule Samridhi. Farmers were also taken to the rice fields grown with local varieties and hybrid rice and their performance were compared with given variety Phule Samridhi.



Four Point Rice production technology

The yield performance of var. Indrayani and Phule Samridhi under demonstration was found more or at par with best hybrid rice variety grown in the area. Interaction and discussion

was also held with farmers for assessment of the overall impact of various technological interventions on performance of rice crop var. Phule Samridhi over local practices compared to local and hybrid rice. Average yield achieved in this area is about 4-6 tonne/ha and average price received by farmers is Rs. 1500 per tone with gross return of Rs. 17 lakhs.

Demonstration of technological intervention in sugarcane crop

A large number of villages in the project area of Navapur Tehsil of Nandurbar district were surveyed and farmers were contacted for demonstration of technological interventions in sugarcane. Farmers were sensitized through personal contact and meetings about the importance of limited availability of water for irrigation, of which a large amount is being used for cultivation of rice and sugarcane following the flood method of irrigation. Farmers were convinced for adapting the water efficient cultivation technologies in sugarcane.



Water Efficient Crop Production technology in sugarcane

Farmer's participatory demonstration on "water efficient crop production technology in sugarcane" was planned and discussed with the farmers. More than 100 beneficiaries were selected from 16 villages (Gadad, Bardipada, Bhardu, Canala, Tilasar, Mahalkadu, Savrat, Devlipada, Vadsatra, Chitvi, Kolda, Karanji BK, Bhavre, Pimpran, Mugdhan and Vaghlapada) of the project area at Navapur Tehsil. Regular monitoring of progress in sowing and management of sugarcane crop was done through training, interaction with individual farmers

and farmers group. Most of the selected farmers adopted improved method of planting along with drip system of irrigation. Average yield achieved in this area is about 40-75 tonne/acre. The average price received by farmer is Rs 2000-2200/tonne, with the total gross return of Rs. 70 lakhs.

To showcase the Farmers Participatory demonstrations on “Water efficient crop production technology in sugarcane” to the farmers of adjoining village/area, a “Farmers Field Day on Sugarcane” was organized at Karanji Bk village of Navapur Tehsil where more than 150 farmers from various villages namely; Karanji Bk., Chitvi, Vadsatra, Mahalkadu, Bhardu, Pimpla, Kolda, Pimpran and Bokaljhar participated in the programme and shared their views through discussions. This programme provided enough opportunity to a large number of farmers to visit the crop and exchange their ideas and at the same time also helped in making awareness about efficient use of water among farmers of the project area.

Improved technology interventions in horticulture crops

Improved technology interventions in onion

Late kharif var Bhima Shakti and Rabi Onion var Bhima Kiran have been distributed to more than 320 tribal farmers, for implementation of improved technology intervention in onion during 2016-2017.

Nursery raising

Proper nursery management is one of the important operations in the onion crop. About 0.05 hectare nursery area is enough for getting seedlings to transplant in one hectare land. Seeds were sown in lines at 50mm to 75mm apart to facilitate the removal of seedlings for transplanting and quick weeding etc.

Transplanting

Proper care was taken by the farmers while selecting seedlings for transplanting. Over and under aged seedlings were avoided for better establishment. At the time of transplanting, one third of the seedling top was cut to get good establishment. The optimum spacing of 15 cm between the rows and 10 cm between plants were maintained.

Average yield achieved in this area ranged from 45.65-59.71 tonne/ha. The average price received by farmer is Rs 8000 per tonne, with the total gross return of Rs. 188 lakhs.



Improved technology interventions in Onion

Improved technology interventions in banana

DBT and ICAR-NRCB certified virus-free tissue culture banana plants var. Grand Nain were procured and distributed to identified farmers at Karanji. During meetings held with the farmers, detailed information related to the pit preparation, application of FYM, Neem cake, application of water soluble fertilizers with drip irrigation and methods for preventing insects were disseminated to the farmers. The use of drip irrigation led to adoption of water and nutrient use efficient cultivation technologies in banana.



Improved technology interventions in virus free tissue culture banana

In Chitvi and Vadastra villages, banana suckers were used as propagation materials. Sword suckers free from diseases and nematodes from the mother plant, with a well-developed rhizome, conical shape with lanceolate leaves, actively growing central bud, weighing 500 to 750 g were separated and selected. The banana were partially harvested (13000-16745 kg/acre). The average price received by farmer is Rs 8.95 per kg, with the total sell of Rs. 4.14 lakhs.

Kitchen gardening of dragon fruit

Activities related to implementation of improved technology interventions in horticulture crops have been expanded. Dragon fruit cuttings/saplings were procured from ICAR-NIASM and distributed to tribal farmers of Navapur Tehsil and Nandurbar District for kitchen gardening / backyard farming.

Livestock and Poultry Interventions for upliftment of livelihood of tribal farmers from Nandurbar district

The topographically Nandurbar district has vast diversity. The Agriculture has mostly been rainfed. Availability of water during summer is a major concern in some of the villages. The traditional livestock farming in the villages selected was highly primitive. Vast stretches of grazing land and existing livestock based economy is in tune with the available agro-ecological situation. With this plus point of natural resources there is tremendous scope for Animal husbandry in the upliftment of livelihood and economic condition of the tribal families.



Livestock and poultry population of Nandurbar district

As per livestock census 2012, total number of livestock in the Nandurbar District are 7,09,076 which is just 2.18% of the state, whereas the total number of poultry in Nandurbar district are 9,63,562 which is just 1.24% of the state. There is vast scope for improvement in the livestock and poultry sector, which may help in up-liftment of livelihood of tribal farmers. The comparative data of 2007 and 2012 census show that there is a negative trend in the total number of cattle, buffaloes, goats and poultry in the district. The tribal farmers need support in terms of trainings, exposure visits and proper inputs for getting proper economic benefits.

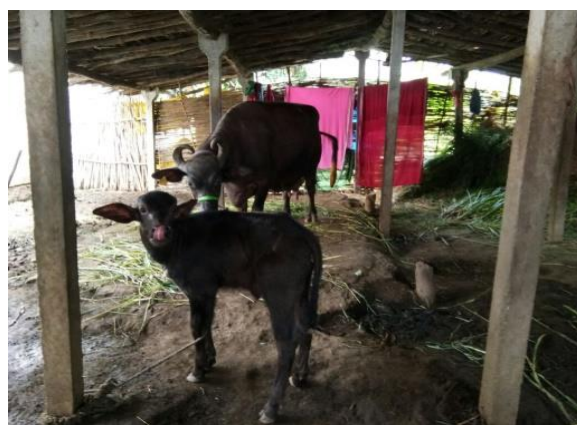
Livestock			Poultry		
Rural	Urban	Total	Backyard Poultry Farms /	Hatcheries Poultry	Total Poultry
694968	14108	709076	490676	472886	963562

Livestock Census 2007 & 2012 of Nandurbar District: Comparative Statement

S.No.	Animal/Poultry Type	2007	2012	% Change
1	Total Exotic / Crossbred	14315	14533	1.52
2	Total Indigenous Cattle	405651	322374	-20.53
3	Total cattle	419966	336907	-19.78
4	Total Buffaloes	95039	72100	-24.14
5	Total Sheep	15229	15276	0.31
6	Total Goats	320888	272753	-15.00
7	Total Backyard Poultry	992440	490676	-50.56
8	Total Birds in Farms / Hatcheries	557500	472886	-15.18

Improved technology intervention in Livestock**Technology intervention in dairy**

The preliminary survey conducted revealed that the animals used for milk were non-discript and low yielding. The farmers were not aware about scientific feeding practices and high yielding animal breeds. Some of the farmers, although knowing about better quality animals, could not afford to purchase such animals. The daily milk collection of the villages, by dairy Cooperatives, was very low. There were many misconceptions of the farmers regarding animal rearing.



In general very few farmers were growing fodder for feeding their animals. There was a lack of knowledge about fodder growing and improved fodder varieties. None of the farmers visited were using silage making technology. Feeding of concentrates was minimal and only to lactating animals.

Improved technology interventions in Dairy animals was conducted during 2015-16, Monitoring and further training were conducted during current financial year 2016-17. Average milk production of 14 buffaloes, supplied during 2015-16, was 108-188 litres/month. The average price received by farmers is Rs 35 per litre, with the total gross income of Rs. 8 lakhs/annum.

Besides this, goat farming as backyard enterprise and Backyard poultry farming with Giriraja birds have been undertaken for livelihood improvement of tribal farmers.

Deworming and mineral mixture supplementation

Training was conducted about parasitic disease of livestock and poultry and its management. More than 500 livestock farmers were provided with a broad spectrum, pregnancy safe, single dose anthelmintic preparation for deworming. After deworming, the dairy animals were supplemented with specially formulated area specific mineral mixture.



Technology Interventions in Backyard poultry:

Issues / Problems identified

- There is no hatchery for dual purpose poultry birds for backyard poultry in the district.
- Avian flu had taken a heavy toll on the industry all over the district.
- There is a 50.56 % decrease in backyard poultry number in 2012 as compared to 2007.
- Lack of knowledge about backyard poultry rearing, using improved stock.
- Annual egg production of birds was reported to be 40-50 eggs/ bird.



Distribution of poultry feed and cages to tribal farmers by Dr. Heena Gavit, Hon'ble MP
Nandurbar at Visarwadi



Monitoring of backyard poultry farming activity at Sarvat and Gadad

Technology intervention in backyard poultry farming has successfully been demonstrated. The cages for backyard poultry units to house 20 birds each were designed, fabricated and supplied to 150 tribal farmers. 3000 Giriraja birds (Dual Purpose) were supplied to these farmers after training and imparting skill for backyard poultry farming. The farmers were also provided with feeders, waterers and feed for initial month. Training programme and the group meetings with tribal farmers on “Backyard Poultry Farming” were organized on the 17th and 18th Sept. 2016 at Visarwadi and Nawapur, respectively. Preference was given to particularly ladies groups from the area. In these training programmes more than 500 tribal farmers participated and were benefitted.

This intervention proved to be a huge success as the birds grew faster and were giving at least 4-5 eggs daily. The male birds grew up to 4-5 kg body weight and were utilized for breeding and meat purpose. This has helped the farmers for getting some additional income as well as providing protein requirement of the family.

The technology interventions in Goat Farming

Issues /problems identified

- Lack of knowledge about scientific goat rearing practices, particularly about
- Feeding and economic management among the tribal farmers.
- Poor quality breeds & non-availability of improved breeds within the reach of poor farmers.
- Poor growth rate, health and reproductive problems and mortality among the goat population in the region.
- There is 15 % decrease in total goat number as per 2012 census data as compared to 2007.

Scope

- Availability of the hilly terrain and stretches of grazing land is highly suitable for goat farming.
- Highly motivated and enthusiastic tribal youth and ladies for adapting goat farming as viable entrepreneurship.

Improved technology interventions in goatery has also been undertaken for livelihood improvement of tribal farmers. Four training programmes of three days duration each were conducted in collaboration with Krantisinh Nana Patil Veterinary College, Shirwal for 177 tribal farmers from Navapur, Dhadgaon and Nandurbar tehsils during 6th to 25th March 2017.



Training programme of tribal farmers on Goat mangement KNPCOVAS, Shirwal

Tribal Farmers were imparted with the skill and knowledge of goat rearing techniques, management, feeding, breeding and disease management, insurance, bank loans etc. during training. Besides on hand training, field visits were also arranged for the farmers. All the trained farmers have expressed determination to take up goat farming in a scientific way and on a commercial scale. Out of these, 44 trained farmers have been supplied with goat units of four does and one buck of Osmanabadi breed. The goats were procured from Punyashlok Ahilyadevi Holkar Sheep and Goat Development Board, Dahiwadi (Govt. of Maharashtra). Farmers are rearing these goats using the available resources with them and the number of goats is increasing with the arrival of new kids.

Implementation of Improved technology interventions in fisheries / IMC aquaculture

Six villages of Navapur Tehsil namely Karanji, Bhomdipada, Borepada, Jamtalav, Chowky and Chitvi were selected for IMC aquaculture. Indian major carp (IMC) fingerlings (size 5-6 g) were stocked in farm/fisheries ponds (stocking density@ 10,000/ha). At villages namely Karanji, Bhomdipada, Borepada, Chowky and Chitvi, water quality parameters such pH, DO and ammonia were measured. Research on fish ponds led to the optimal water quality and plankton primary productivity. In order to control ammonia level, zeolite (stilbite) trapped with silver nanoparticles was applied in the pond.



Stock enhancement in small reservoirs /water bodies

This has helped in alleviation of multiple abiotic and biotic stresses in the pond with the result of higher fish production. Water analysis kit was also used for measurement of these parameters in the field. Fishes were partially harvested. The average price received by farmers is Rs 100-150 per kg, with the total gross return of Rs. 7.5 lakhs.

Trainings organized:

- On the 2nd November, 2016, participatory demonstration of “Four point rice production technology was successfully done on farmers field (Beneficiaries >100 tribal farmers).
- On the 15th February 2017, exposure visit related to precision farming and micro-irrigation systems, agro-products and cultivation of tissue culture plants were organised at Jain Irrigation Jalgaon. 100 Tribal farmers participated and were benefitted.



- On the 14th February, 2017, training programme related to backyard poultry farming was conducted, where backyard poultry cages and Vanaraja birds along with other poultry inputs were distributed to Tribal farmers. More than 300 tribal farmers participated in the programme.
- On the 6-8, 9-11, 20-22 and 23-25 March 2017, four exposure visits for three days each related to goat farming training campaign were conducted at Krantisinh Nana Patil Veterinary College, Shirval (KNP) College of Veterinary Sciences, Shirval. 177 tribal farmers from Navapur, Dhadgaon and Nandurbar have been benefitted from this training programme.
- During human resource development by enhancing their access to education Training programme on “Nutritional management in livestock and fisheries for livelihood improvement of tribal farmers” conducted at Visarwadi and Navapur on 17-18 September 2016, Farmers from various villages of Navapur (Nagzari, Waghpalpada, Pimpran, Kolada,

Savarat, Gadad, Jamtalav, Karanji, Bardipada, Chitavi, Deolipada, Vadsatra, Tilasar, Mahalkadu, Bharadu, Kanhala, Mugdhan, Pimpla, Karanjibk, Bokalzhar, Bhavare, Ampada, Rayngan, Bandharpada, Chauky) participated in training programmes. During training, farmers were guided on “Parasitic diseases and deworming in livestock” “Nutritional Management in Livestock”, “Fish Farming” and “Integrated agri-aquaculture” by the team. Integrated agri-aquaculture was successfully demonstrated through demonstration on improved technology intervention in IMC aquaculture, field and horticulture crops.

- Training programme on fish feed preparation was conducted on 26 March 2017, where 100 farmers participated and benefitted. Thereafter, farmers participated in the interactive session and expressed their happiness with wider exposure received during the training programme and huge beneficial impact of ongoing TSP activities related to successful implementation of integrated agri-aquaculture at Nandurbar District.
- Exposure visit on fish and prawn farming and their management was organised for 38 tribal farmers of Navapur tehsil of the Nandurbar District at Krishi Vigyan Kendra, Navasari on March 25, 2017.
- On the 7 & 8th February 2017, exposure visit related to Group base cultivation and marketing of baby corn was organized (Beneficiaries 90 Tribal farmers).

Summary of the training programmes / field day / exposure visits organized

Sl. No.	Programme	Duration and Place	Beneficiaries	Total Amount, Rs.
1	A training programme on “Nutritional management in livestock and fisheries for livelihood improvement of tribal farmers”.	17-18 th Sep. 2016 Visarvadi Navapur,	More than 350 tribal farmers	35865 33735
2	Exposure visit related to precision farming and micro-irrigation systems, agro-products and cultivation of tissue culture plants at Jain Irrigation Jalgaon.	15 th Feb. 2017	100 Tribal farmers	-
3	Training programme related to backyard poultry farming related to Tribal farmers.	14 th Feb. 2017	More than 300 tribal farmers	-

4	Training programme for fish feed preparation	26 th March 2017	100 farmers	20214
5	Exposure visit related to Group base cultivation and marketing of baby corn	7 & 8 th Feb. 2017	90 Tribal farmers	42240
6	Four exposure visits for three days each related to goat farming training campaign for the farmers from Navapur, Dhadgaon and Nandurbar have been benefitted from this training programme.	6-8, 9-11, 20-22, 23-25 th March 2017, Krantisinh Nana Patil Veterinary College, Shirval (KNP) College of Veterinary Sciences, Shirval	177 Tribal farmers	354000
7	Exposure visit on fish and prawn farming and their management	25 th March, 2017. Krishi Vigayan Kendra, Navasari	38 tribal farmers of Navapur tehsil	56981
8	Participatory demonstration of “Four point rice production technology in a farmers field	2 nd Nov. 2016,	>100 tribal farmers	34850

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Quarter: April 2016 - June 2016

Sl. No.	Strategies/Initiatives/Activities	Period	No. of Tribal Beneficiaries
1	Improved technology interventions in rabi onion (harvested)	April, 2016	600
2	Survey of villages for planning intervention related to livestock and poultry	April, 2016	150
3	Seed of high yielding rice varieties (Indrayani and PhuleSamrudhi) were distributed to >100 selected farmers from 6 villages	May, 2016	>100
4	Rice nursery has been raised by all the farmers and transplanting will be done once seedlings are 25-30 days of age.	May, 2016	>100
5	Sugarcane crop is under progress	June, 2016	>100
6	Purchase order given for fabrication of poultry cages	June, 2016	150
7	Implementation of improved technology intervention in IMC Aquaculture	June, 2016	10
8	Formation of a commodity interest group of tribal farmers is in progress	June, 2016	40
9	Improved technology interventions in banana	June, 2016	4

Financial & Physical Achievement of TSP in 1st Quarter (April-June, 2016)

Amount Earmarked (2016-17)	Financial Achievement (Rs.)	Physical Achievement			
		Number of beneficiaries/ Village	Physical assets Created	Types of the assets created	Any other Information
1,25,00,000	1,43,596	20	-	-	-

Quarterly Progress Overview

Quarter : July to September 2016			
Sl. No.	Project / Scheme	Beneficiaries (Nos.)	Location (Tehsil)/Villages
1.	Field crops 1. Monitoring of transplanted rice 2. Distribution of fertilizers for Sugarcane crop	100 100	(Navapur) Mugdhan, Bhardu, Chitavi, Vadshatra Nagjhari, Devlipada and (Navapur) Gadad, Bardipada, Bhardu, Canala, Tilasar, Mahalkadu, Savrat, Devlipada, Vadshatra, Chitvi, Kolda, KaranjiBk, Bhavre, Pimpran, and Mugdhan
2.	Livestock and Poultry 1. Parasitic diseases and deworming in livestock 2. Training programme on “Nutritional Management in Livestock for livelihood improvement of tribal farmers”	200	(Navapur) Nagzari, Wagharpada, Pimpran, Kolada, Savarat, Gadad, Jamtalav, Karanji, Bardipada, Chitavi, Deolipada, Vadsatra, Tilasar, Bharadu, Mahalkadu, Kanhala, Mugdhan, Chauki Pimpla, Karanjibk, Bokalzhar, Bhavare, Ampada, Rayngan, Bandharpada,
3.	Integrated Agri-aquaculture 1. Implementation of improved technology intervention in IMC Aquaculture 2. Training programme on “Nutritional Management in Livestock for livelihood improvement of tribal farmers”	200	(Navapur) Nagzari, Wagharpada, Pimpran, Kolada, Savarat, Gadad, Jamtalav, Karanji, Bardipada, Chitavi, Deolipada, Vadsatra, Tilasar, Bharadu, Mahalkadu, Kanhala, Mugdhan, Chauky, Pimpla, Karanjibk, Bokalzhar, Bhavare, Ampada, Rayngan, Bandharpada
4.	Marketing Management Distribution of 125 Kg Seeds of baby corn to tribal farmers	25	(Navapur) Gadad, Bardipada, Bhardu, Canala, Tilasar, Mahalkadu, Savrat, Devlipada, Vadshatra, Chitvi, Kolda, Karanji Bk, Bhavre, Pimpran, Mugdhan
5.	Horticulture 90 kg <i>late kharif</i> onion seeds	90	(Navapur) villages

Quarter: July to September 2016

Sl. No.	Strategies/Initiatives/Activities	Period	No. of Tribal Beneficiaries
1	Monitoring of transplanted rice	July-Sept 2016	100
2	Improved technology intervention in Late kharif onion	July, 2016	90

Amount Earmarked (2016-17)	Financial Achievement (Rs.)	Physical Achievement			
		Number of beneficiaries/ Village	Physical Assets Created	Types of the assets created	Any Other Information
125,00000	5,28,628	20	150	Backyard Poultry Cages	(Total Rs 30.15 Lakhs booked / committed before Sept. 2016)

Sl. No.	Budget received (Rs in lakh)			Budget utilized (Rs in lakh)		
	Capital	Revenue	Total, Rs.	Capital	Revenue	Total, Rs.
1	50	75	125	49	71	120

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		Fisheries Fish feed kg 3150 3150 Fish Feed pelletizers nos 2 2 Grinders for preparation of fish feed nos 5 5 Aerators nos 3 3 Ice boxes for aquaculture nos 22 22 Horticulture Dragon fruit cuttings nos 20,00 20,0 Chilli seeds kg 0 00 Kharif onion seeds kg 20 20 Vegetable seeds kg 100 100 Virus free tissue culture banana plants nos 500 400 qtls 7000 7000 Fertilizers for banana nos 103 103 Compost production units nos 40 40 Agricultural sprayers nos 80 80 Multi-purpose containers nos 575 575 Soil analysis kit (Mridaparishak) nos 1 1 Power tillers with accessories 12 12 Group based production and marketing of vegetables Insect net m ² 16000 1600 Mulching paper for vegetable cultivation role 150 0 150 Miscellaneous (Bags, polythene bags, neem cake, phorate, calendars of improved technology interventions)			
2		<i>Trainings organized / Capacity building</i> Exposure visits nos 7 7 Training programmes nos 2 2		9	100%
3		<i>Individual Farmers / Farm Families benefitted</i> (Improved technology interventions in integrated farming in terms of field & horticulture crops, livestock & poultry, and fisheries & integrated agri-aquaculture) Improved technology interventions in field crops nos 100 100 Improved technology interventions in horticulture crops nos 1350 1350 Improved technology interventions in livestock and poultry nos 1327 1327 Improved technology interventions in fisheries nos 140 140 Group based production and marketing of vegetables nos 128 128		>3000	100%

Post Technology Intervention Assessment

Productivity and income enhancement

ICAR-NIASM has successfully implemented integrated farming, benefitting tribal farmers in terms of adoption of improved technology interventions in field crops (rice and sugarcane), horticulture crops (banana and onion), livestock farming (Fodder, Osmanabadi goats and Mehsana buffaloes), backyard poultry (Vanaraja) farming, fisheries and Integrated agri-IMC aquaculture. These interventions led to higher production of rice (Phule samrudhi 6.5–10 tonnes/ha), sugarcane (40-75 tonnes/acre), onion (Var. Bhimakiran 35–79 tonnes/ha, Bhimashakti 25-65 tonnes/ha), banana (partial harvest 13000-16745 kg), milk (108-188 Litres/month), and fish (> 3000 kg/ha). Implementation of improved technology interventions by ICAR-NIASM in field crops (rice, sugarcane), horticulture (onion, okra, chilli, banana), livestock (dairy and goat farming), fodder, poultry (backyard poultry), fisheries (IMC aquaculture) and Integrated agri-IMC aquaculture benefitted tribal farmers in terms of adoption of improved technology interventions, enhancing income of the tribal farmers of different Tehsils of Nandurbar District by 75%.

Rice yield

Variety	Cultivated area (ha)	Number of Beneficiaries	Straw yield (Tonne/ha)	Paddy Yield (Tonne /ha)	Gross return (Rs. lakhs/ha)	Total Gross return (Rs lakhs)
<i>Phule Samrudhi</i>	14	34	9.0 – 19.0	6.5-10	1.24	17

Sugarcane yield during 2015-2017

Variety	Cultivated area (ha)	Number of Beneficiaries	Yield (Tonne/ha)	Gross return (Rs. lakhs/ha)	Total Gross return(Rs lakhs)
Co 86032 Co 265	70	198	100 – 185	3.15	221

Onion Yield

Onion variety	Cultivated area (ha)	Number. of Beneficiaries	Yield Tonnes /ha	Average yield Tonnes/ha	Rate / tonnes (Rs.)	Gross return (Rs. lakhs/ha)	Gross return (Total Rs lakhs)
<i>Rabi</i> (Bhima kiran)	31	241	35 – 79	59.71	8000	4.78	188
<i>Late kharif</i> Bhima shakti	11	80	25-65	45.65	8000	3.65	

Banana suckers

Variety	Cultivated Area (ha)	Number of Beneficiaries	Partially Harvested (kg)	Rate/kg (Rs.)	Gross Return (Total Rs. lakhs)
Grand Nain (Suckers)	2	4	13000-16745	8.95	4.14

Dairy farming

Breed	Number of Beneficiaries	Average Milk production Litres / month during 2016-17	Rate (Rs./Litre)	Gross Return (Total Rs. lakhs)
Mehsana buffaloes (supplied during 2015-16)	14	108-188	35	8

IMC aquaculture

Fish species	Cultivated area (m2)	Number of Beneficiaries	Partial harvest(kg)	Rate/kg	Gross return (Rs. lakhs)
Indian major carps	900-2000	11	115-3250	100-150	7.50

Innovations introduced

1. Four-point rice production technology
2. Promotion of *Gliricidia* plantation for rice cultivators as live fences, and green leaf manure for crop production and animal forage.
3. Water efficient crop production technology in sugarcane
4. Improved technology intervention in cultivation of late kharif and rabi onion with high yielding and long storage and seed generation
5. Cultivation of virus free tissue culture banana and suckers of the same cultivar
6. Economically viable compost production for organic farming
7. Improved technology intervention in kitchen gardening of dragon fruit
8. Improved technology intervention in high yielding dairy and goat farming with nutritional and disease management
9. Improved technology intervention in backyard poultry farming
10. Improved technology intervention in backyard Goat farming
11. Economically and environmentally viable farm pond preparation
12. Intensive aquaculture of Indian Major Carps
13. Method development for fish feed preparation
14. Development and application of zeolite based nano-composite for alleviation of abiotic and biotic stresses in farm pond aquaculture
15. Optimization of water quality in fisheries/farm ponds through best management practices
16. Implementation of other off-farm activities and value addition to improve livelihood of tribal farmers.
17. Integrated farming in terms of field and horticulture crops, dairy and poultry farming, Fish farming and Integrated agri-aquaculture
18. Improved technology intervention in Integrated Crop-Livestock-Fisheries, Integrated Livestock cum Fish farming, Integrated Goat cum Fish farming, Integrated agri-aquaculture, Integrated dairy cum Fish farming, Integrated poultry cum Fish farming

Details of technology disseminated and area covered/inputs distributed

*(I): Individual; (F): Families; (SHG): Self-help groups

Sl. No.	Name of the input	Quantity	Beneficiaries I/F/SHG, (Nos)*	Tehsil	Villages	Technology disseminated
1	Soil analysis kit	1	1 (SHG) (More than 100 farmers)	Navapur	Chitvi	Soil health card based fertilizer recommendations
2	Power tillers with accessories	12	7 (SHG)+ (More than 200 farmers) 5 (SHG)	Navapur Nandurbar	Savrat, Chitvi, Vadsatra, Karanji, Naghjhari, Chowky Mughdhan Natavad, Pawla, Arditara, Umaj, Devpur	Improved technology interventions in field crops
3	Poultry feed	3750	150 (F)	Navapur	Vadsatra, Chitvi, Wagdi, Devalipada, Savrat, Jamtalav, Naghjhari, Moryuva	Improved technology intervention in Backyard poultry farming
4	Waterers	150	150 F	Navapur		
5	Feederers	150	150 F	Navapur		
6	Fabricated poultry cages	150	150 (F)	Navapur		
7	Giriraja chicks	3000	150 (F)	Navapur		
8	Feed pelletizers for fish feed	2	2 (SHG)	Navapur	Karanji, Chowky	Improved technology intervention in fisheries and IMC aquaculture
9	Grinding machine for fish feed	5	2 (SHG)	Navapur	Chowki, Chitvi, Karanaji, Jamtalav	
10	Aerators	3	3 (SHG)	Navapur	Chowki, Chitvi, Karanji	
11	Ice box for preserving/transporting fishes on harvest	22	22 (I)	Navapur	Karanji, Chowki, Chitvi,	
12	Goats	220	220 (F)	Navapur Dhadgaon Nandurbar	Karanji, Naghjhari Mughbhari, Pawla	

Sl. No.	Name of the input	Quantity	Beneficiaries I/F/SHG, (Nos)*	Tehsil	Villages	Technology disseminated
13	Multi-purpose containers	575	575 (F)	Navapur Dhadgaon Nandurbar	Tarapur, Pimpran, Kanha, Devalipada, Wagdi, Vadsatra, Chitvi, Savrat, Raigaon, Gadad, Mughdhan, Khoksa, Kukran, Khochapada, Tarapur, Payravahir, Bhardu Bokhaljhar, Bhavre, Shirve, Pimpraon, Chowki, Chetapada, Bhardu, Naghjhari, Jamtalav, Kotkhan, Karanji, Chichalipada, Ramchandraphali Mughbhari, Pawla, Natavad, Umaj, Devpur, Tokartalav, Arditara	For storing grains
14	Compost production units	40	40 (F)	Nandurbar	Pawla, Arditara, Devpur, Natavad	Organic farming
15	Agricultural sprayers for application of agro-chemicals	80	40 (I) 40 (I)	Navapur Nandurbar	Mughdhan, Davalipada, Vadsatra, Vadagaon, Pimpla, Naghjhari, Bhardu, Pimpran, Pawla, Arditara, Natavad, Umaj, Devpur, Totartalav	Improved technology intervention in vegetables
16	Chilli seeds	20 kg	88 (I)	Navapur Nandurbar Dhadgaon	Mughbhari, Chitvi, Dhanajekhu, Karanji, Gadad, Devalipada, Vadsatra, Bhardu, Khochapada, Savrat Chetapada, Dhanaje, Bhujgaon, Pawla, Natavad, Umaj, Arditara, Bhujgaon Mughbhari, Harankhuri	
17	Vegetable seeds	400 kg	216 (I)	Navapur	Tarapur, Karanji, Kodkhan, Pimpla, Mughdhan, Pimpran,	Improved technology

Sl. No.	Name of the input	Quantity	Beneficiaries I/F/SHG, (Nos)*	Tehsil	Villages	Technology disseminated
					Bhardu, Bhavare, Badhlapada, Devalipada, Bhardu, Borepada, Chowky, Chichalipada, Shirve, Khoksa, Vadsatra, Bokhaljhar Umaj, Pawla,	intervention in vegetables
				Nandurbar		
18	Mulching paper	80 roles	40 (I)	Navapur	Mughdhan, Pimpran, Sheri, Vadsatra, Karanji Kurd, Bhavare, Amlaon, Bokhaljhar, Umraon, Bedakipada, Bhomadipada, Nagjhari	
19	Insect net	16000 m ²	40 (I)	Nandurbar	Pawla, Arditara, Devpur, Natavad	
20	Vitamin Mineral mixture	2750 kg	193 (I) 1101	Navapur	Kukraon, Pimpran, Nagjhari, Karanji, Gadad, Devalipada, Chitvi, Vadsatra, Tarapur, Kolda, Khoksa, Uchimoli, Bhardu, Chowky, Bhomadipada, Raigaon, Kukran, Borvihir	Improved technology intervention in dairy
				Dhadgaon	Mughbhari	
21	Virus free tissue culture banana plants	7000	5 (F)	Navapur	Karanji	Improved technology interventions in virus free tissue culture banana
22	Fertilizers for banana	103 qtl	5 (I)	Navapur		
23	Neem cake, phorate	Miscellaneous	5 (I)	Navapur		
24	Feeding buckets	700	700 (I)	Navapur	Vadsatra, Nagjhari, Kukran, Pimpran, Jamtalav, Khopada, Mughdhan, Kotargaon, Chitvi,	Improved technology intervention in dairy
25	Milk cans	700	700 (I)			

Sl. No.	Name of the input	Quantity	Beneficiaries I/F/SHG, (Nos)*	Tehsil	Villages	Technology disseminated
				Dhadgoan Nandurbar	Karanji, Kolda, Vadsatra, Navapada, Bhardu Savrat, Badharpada, Kamod, Raigaon, Gadad, Mughdhan, Khokasa, Kukraon, Tarapur, Chetapada, Khoyapada, Khoksa, Kanhala, Kadvan, Bokhaljhar, Pimpla, Wagdi, Payarvihir, Chowky, Devalipada, Bhomadipada, Ramchandraphali Mughbhari Pawla, Devpur, Umaj, Natavad, Aritara, Tokartalav,	
26	Bags, polythene bags and technology calendars	Miscellaneous	Farmers	Navapur and Nandurbar	Villages of Navapur and Nandurbar	For distribution in training programmes
27	Fertilizers	162.66 quintal	100 (I)	Navapur	Gadad, Bardipad, Bhardu, Canala, Tilasar, Mahalkad, Savrat, Devlipada, Vadsatra, Chitvi, Kolda, KaranjiBk, Bhavre, Pimpran, Mughdhan	Improved technology interventions in sugarcane
28	Rice seeds (var. Phule Samridhi)	425 kg	34 (F)	Navapur	Mugdhan, Bhardu, Vadsatra Nagjhari, Chitvi, Devlipada,	Improved technology intervention in four point rice production technology
29	Urea Briquette MOP	1883 kg 700 kg	34 (F)	Navapur		
30	Late kharif onion seeds	90 kg	80 (I)	Navapur and Nandurbar	Kolda, Pimpran, Chitvi, Vadsatra, Devalipada Mahalkad, Karanji	Improved technology interventions in

Sl. No.	Name of the input	Quantity	Beneficiaries I/F/SHG, (Nos)*	Tehsil	Villages	Technology disseminated
	(var. Bhima super)					late kharif onion
31	Rabi onion seeds (var. Bhimakiran)	250 kg	241 (I)	Navapur	Pimpran, Karanji, Kukran, Bokaljhar, Jamtalav, Gadad, Mughdhan, Devalipad, Chitvi, Borepada, Vadsatra, Kanhala, Badhlapada, Pimpali, Nagjhari	Improved technology interventions in rabi onion
32	Dragon fruit saplings / Cuttings along with plastic bag	20000 Cuttings	784 (I)	Navapur	Gadad, Chitvi, Bokhaljhar, Bhavare, Chowky, Pimpran, Vadsatra, Kanhala, Wagadi, Chichlapada, Devakipada, Pimpla, Radhanagar, Bhardu, Nagjhari, Bhardu, Ukalapani, Mughdhan, Pangran, Karanji, Mohanpada, Kelapada, Bedki, BhomadipadaSudi, Borepada, Kamode, Borejhar, Ardipala, Jamtalav, Payarvihir, Vavadi, Bilgahan, Savrat, Vasave, Khekda, Kolda, Bandhare, Sonare, Badkhut, Bhogarpada, Paybedki, Ninmoli, Umran, Dokore, Bilipada, Chedapada, Bilgahan, Nagjhari, Vedapwli, Pimparipada, Bhandare, Vadhlapada, Bhogadpada Pawla Mughbhari	Kitchen gardening of dragon fruit
				Nandurbar Dhadgaon		

Sl. No.	Name of the input	Quantity	Beneficiaries I/F/SHG, (Nos)*	Tehsil	Villages	Technology disseminated
33	Baby corn seeds	315 kg		Navapur	Gadad, Bardipada, Bhardu, Canala, Tilasar, Mahalkad, Savrat, Bhavre, Devlipada, Chitvi, Vadshatra, Kolda, KaranjiBk, Pimpran, Mugdhan	Improved technology interventions in baby corn
34	IMC seeds		10 (I)	Navapur	Karanji, Bhomadipada, Chitvi, Borepada, Jamtalav, Chowky,	Improved technology interventions in farm pond based IMC aquaculture
35	IMC seeds	25000	6 (I)	Navapur	Karanji, Borepada, Jamtalav, Chitvi, Raigaon	
36	Fish feed	3150 kg	15 (I)	Navapur	Karanji, Bhomdipada, Borepada, Jamtalav, Chowky, Chitvi, Raigaon	

Publications

1. ICAR-NIASM technical Bulletin No. 10. A step towards improving livelihood of tribal farmers through Integrated farming, Pp.50.
2. ICAR-NIASM Technical Bulletin No.11 (Samnvit matsya palan), pp.12.
3. ICAR-NIASM Technical Bulletin No. 12 (Ekatmik Matsya Palan/Integrated Agri-aquaculture), pp.12.
4. ICAR-NIASM Technical Bulletin No.13 (Matsya palan/Fish Farming), pp12.
5. ICAR-NIASM Technical Bulletin No. 14(Carp Savardhan), pp.12.
6. Fodder management of Dairy animals during Summer. Technical folder No.17 2017.
7. TSP Brochure: Fish feed preparation. Technical folder No. 20. 2017.
8. Improving livelihood of tribal farmers through implementation of improved technology intervention in integrated agri-aquaculture. SEPO13, pp 469. 11th Indian Fisheries and Aquaculture Forum, Kochi, 2017.

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