

Annual Report of OCPF-AES Karnataka 2015-2016

FONDATION



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List of Abbreviations/Acronyms

ATMA:	Agriculture Technology Management Agency
AES:	Agriculture Extension Services
ABC:	Agribusiness Centre
CEO:	Chief Executive Officer
DAE:	Department of Agriculture Extension
DCS:	Diversified Cropping System
DLS:	Department of Livestock
DoA:	Department of Agriculture
DoF:	Department of Fisheries
FIG:	Farmers Interest Groups
FFS:	Farmers Field Schools
FPO:	Farmers Producer Organization
GAP:	Good Agriculture Practices
GDP:	Gross Domestic Product
HQ:	Head Quarter
Ha:	Hectare
IAC:	Initial Awareness Campaign
ICT:	Information Communication and Technology
ICAR:	Indian Council of Agriculture Research
ICM:	Integrated Crop Management
INR:	Indian Rupees
INM:	Integrated Nutrient Management
IPM:	Integrated Pest Management
IEC:	Information Education and Communication
IFS:	Integrated Farming Systems
IWM:	Integrated Water Management
ISAP:	Indian Society of Agribusiness Professionals
KVK:	Krishi Vigyan Kendra
MIS:	Management of Information Systems
NGO:	Non-governmental Organization
PoP:	Package of Practices
PPP:	Public Private Partnership
LCFM:	Low Cost Farm Machinery

Introduction

The OCPF Agriculture Extension Services (AES) project in Karnataka started in 2010 in the form of a pilot project and focused mainly on soil health improvement and yield enhancement in Northern Karnataka. The first phase of the project continued for four years, and every year, new dimensions were added to the program, which were directly related to project objectives and need of the farmer beneficiaries.

In a period of four (4) years, the project was able to organize and institutionalize project farmers into “Farmer Producer Organizations” (FPOs) and created linkages of these FPOs with the players and stakeholders of the market value chain, backed by value addition to farm produce at the farm gate. Seven (7) FPOs were successfully created in the districts of Gulbarga, Bidar, and Raichur by the end of the first phase of the project, and farmers in the project areas were organized.

Currently, the project is in its second phase, and the main thrust of the project in its present form is to make the FPOs that have been formed, sustainable. Sustainability is being achieved through market integration, infrastructure support and convergence with various agri-business and farmer friendly schemes. Total beneficiaries of the OCPF-AES project so far are 7000 farmers, and the locations of the project in Karnataka are Afzalpur, Aland, and Chittapur in Gulbarga district; Raichur in Raichur district; and Basavkalyan and Bhalki in Bidar district. Farmers in the project area mainly grow grain legumes under the rain-fed farming system, and the main crop of this area is pigeon pea.

The Main Activities under this Project are the Following:

1. Promotion of Best Available Package of Cultivation Practices (PoPs)
2. Promotion of Integrated Farming Systems (IFS) among the Lead Farmers
3. Training and Capacity-building on Crop Production and Market Integration
4. Use of ICT for Enhancing Production and Market Opportunities
5. Strengthening FPOs Agribusiness Activities, Value Addition and Market Integration
6. Tackling Major Human Development Issues in Project Areas
7. Convergence with Other Stakeholders Schemes to Strengthen Market Integration
8. Creation of FPO Federation in North Karnataka
9. New Initiative under Market Integration: Kisan Fresh (Producer to Consumer)

1. Promotion of Best Available Package of Cultivation Practices (PoPs):

Soil Testing

Like previous years, complete Package of Practices (PoPs) was adopted in the project areas and interventions were made in every stage in 2015-2016 as well – from soil testing onwards. Soil testing was conducted on a total of 467 samples for important micro and macro nutrients, and Soil Health Cards were distributed to all the project farmers. These Soil Health Cards provide pertinent information about micro and macro nutrients that are available in the soil, and also provide guidance on the required quantity of fertilizers that should be used for the next crop.

Soil health status for the year 2015-2016

One of the main emphasis of the OCPF project was to create awareness about the soil health status of their soils amongst the farmers associated with the project, and to guide them to adopt scientific recommendations to grow field crops in general and pigeon pea in particular. Soil testing was done for 467 plots (including 135 acres of demo plots).

To evaluate soil health status of farm soils, soil samples were collected and analyzed under the supervision of agricultural experts and soil scientists respectively. Soil samples were analyzed for soil pH, EC and available nutrients like N, P, K, S, Zn, Fe, B and Mo. Soil health cards showing available nutrient status and fertilizer recommendations were issued to each farmer.



Distribution of Soil Health Cards to project farmers

The main findings of the soil test reports can be summarized as below:

- All soils need nitrogen application as basal dose. Pigeon pea being a legume manages its nitrogen requirement through rhizobia during later stages.
- Except in Aland block, most of the soils are low to medium in available P content and so need P application as basal dose. In Aland block about 60% soils are rich in P.
- Except in Basavkalyan block where about 55% are low to medium in available K, most of the soils in other blocks are rich in K and so need K fertilizer only in 10-20% fields.
- Sulfur was limited in 97% soils. So almost all soils need adequate supply of S through Gypsum or other sources. Most soils being calcareous, foliar application can also be useful.
- 82% soils in Gulbarga, 75% in Bidar and 55% soils in Raichur are deficient in available Zinc and so require ZnSO₄ application as basal dose.
- Except in Basavkalyan block, Iron (Fe) is deficient in all soils. In Basavkalyan block also about 70% soils were Fe deficient. So Fe needs to be applied preferably as basal dose. It can also be supplemented through foliar spray at about 30 days' stage of crop.
- About 73-95% soils in all blocks are deficient in available Boron content. Basal or foliar application is needed in most of the soils.
- Molybdenum is generally not limited in most of the samples. However only in some pockets Mo may be required as foliar spray.
- There is no soil salinity problem in any of the soil samples.
- Most of the soils are normal in soil reaction. However in some pockets some marginal soil alkalinity problem has been noticed where soil pH was more than 8.5.

Farm Demonstrations

Farm Demonstrations (demos) are a powerful tool to promote Good Agricultural Practices in India. A demonstration farm is a farm which is used mainly to demonstrate problems related to farming and a variety of agricultural techniques, leading to increase in yield and enhanced income. Experts have regular interaction with the farmers in an informal class at the demonstration field, and the farmers in the area get access to potential technology adopted at the demonstration. Farmers receive additional subject matter training to refresh their knowledge and skills. Farmers receive guidance on inputs (seeds, fertilizers, pesticides etc. and organic inputs such as FYM, vermi-compost, etc), efficient use of water, efficient use of farm power (farm machinery, tools and equipments), Integrated Pest and Nutrient Management (IP and NM) and so on, depending on local context.

As part of this project, in 2015-16, as many as 7 Large Scale Demonstrations (LSDs) covering 10 acres (4 ha) each were laid out with full Package of Practices to maximize productivity of pigeon pea crop. An intercrop of soybean (variety JS 335) was also taken with this main crop of red gram. In addition, 35 Small Scale Demos (five 1-acre demos in each FPO area) were laid out with essentially the same objective and 2 block level demos of 15 acres each in Bidar district and Gulbarga district respectively were taken up. The weather was not favorable in the past season all through the crop cycle and sowing got delayed due to late arrival of monsoons.

Many regions in northern Karnataka experienced drought in this period. Keeping this situation in perspective, in a total of 135 acres demonstration plots - only Hudgi block demonstrations in Bidar district have come up well. In Aland block, sowing has not been done as there was no rain. In Afzalpur block, late sowing was done and the weather has not been conducive in this belt this year. Similar situation is prevalent in Raichur block as well.

Demonstration Plots with Conducive Climate



Chittapur block demo



Hudgi block demo



**Large Scale Demo at
Halbarga**



**Small Scale Demo at
Raichur**

Demonstration Plot in Drought Areas



A patch under drought at
Large Scale Demo,
Sastapur, Basavkalyan, Bidar



Large Scale Demo, Raichur

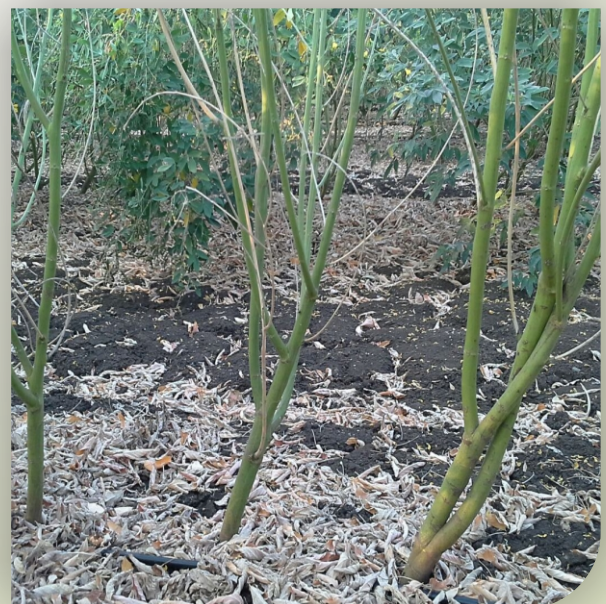


Stunted growth due to water
stress in Large Scale
Demo at Afzalpur



Small Scale Demo at Gonal,
Raichur

Demonstration plots, where innovative drought mitigation methods were deployed



Pit method, Halbarga LSD, TS3R variety + region received better rainfall



Pit method, Gulbarga Chorgasti plot, TS3R variety + hand watering method

Effectiveness of Pit Method

It has been observed that the pit method has been a very effective method in drought conditions. In one success story, a farmer (Mr. Chorgasti, Pattan village, Gulbarga district) used the hand watering method in pit method and obtained 25 quintals of red gram yield in 4.5 acre of land. The amount spent on hand watering using labor is Rs.4000/- in addition to the per acre cost of cultivation Rs.4456/- per acre undertaken for pit method cultivation.

As the price of red gram is Rs.8500/- (March 2016 APMC prices), the total income from 4.5 acre is Rs.212500/- and the expenditure including hand watering cost of Rs.4000/- is Rs.21824/- for 4.5 acres. Hence, it can be considered that the pit method with providing water for 2 to 3 times during flowering stage and pod formation stage is highly beneficial to the farmers in getting good yield even during the drought situations. In case of farmers for whom the hand watering is difficult, they can opt for drip irrigation for committed yield from the field.

2. Promotion of Integrated Farming Systems (IFS) Among the Lead Farmers

Integrated Farming Systems (IFS) is a strategic resource management approach to achieve steady economic output from a farm, to meet the diverse requirement of farm household while preserving the precious resource base. IFS, a multiple land use pattern through integration of crops, horticulture activities, animal husbandry, can be conducive to sustained production of different kinds of farm products yielding significant income from a unit land area.

ISAP is actively promoting IFS among farmers in the project area. In this direction, awareness campaigns were organized at Basavkalyan, Bhalki, Halbarga, Aland, Afzalpur, Ankalaga and Chitapur. Extensive meetings were organized in these places and the concept of IFS and its benefits were explained with practical examples brought home by the lead farmers. Final 70 farmers have also been shortlisted for IFS. Seven (7) IFS trainings in Bidar and Gulbarga districts have been provided to the farmers.

Table 1: List of Trainings Conducted for IFS Farmers

S.No.	Training Date	Venue	Number of Farmers	Name of Resource Persons	Topic Covered/Agenda
1	01-11-2015	ISAP RO, Gulbarga	30	Dr. S. A. Patil	IFS modules and benefits
2	08-10-2015	KVK, Gulbarga	40	Mr. Raju Teggalagi, Dr. Anand	IFS new approach and the economics
3	23-09-2015	KVK, Bidar	30	Dr. Ravi Deshmukh, Mr. Vivek Chakkote	IFS constraints and benefits
4	11-07-2015	KonMelkunda, Bidar	20	Dr. S.A. Patil	IFS new approach and profitability
5	13-07-2015	ISAP RO, Gulbarga	33	Dr. S.A. Patil, Dr. Nagaraj	IFS models and water management
6	08-07-2015	Hebbal village, Gulbarga	30	Mr. Premsing	IFS system, components and benefits
7	26-05-2015	Tadkal AVRC, Gulbarga	25	Dr. S.A. Patil	IFS approach and success stories

IFS farmers' training pictures



IFS farmers' training at Gulbarga block



IFS farmers' training at Bidar block



IFS farmers interacting with water management expert along with Dr. S.A. Patil in Gulbarga

Under IFS for OCPF-AES Karnataka, project farmers are encouraged to undertake allied activities to achieve better returns. Under this initiative, a total resource-based convergence will be exercised in terms of cropping, horticultural activities, animal husbandry and aquaculture so as to deploy resource-based outputs as input for another activity in a cyclic manner. Thus, the animal waste and crop waste will be recycled as organic manure; the additional income from allied activities will be converted as input for fodder and fruit/vegetable growing to get a daily cash supply, and so forth. These synergies will help minimize production costs and maximize returns per unit area from all activities put together. Moreover, the entire cycle will be viable and sustainable. This year, 70 farmers have been selected for IFS support. These farmers are being assisted to start azolla cultivation, vermi compost, horticulture crops, agro forestry crops and goat rearing/poultry activities.



Horticulture and agro forestry plant distribution, Bidar



Vermi-compost and sericulture unit at Gulbarga



Livestock components distribution in Basavkalyan, Aland, Afzalpur and Ankalaga blocks

Farmers' visits to IFS units

Group visits of farmers were arranged on the IFS units of lead farmers who have already established their farms with different activities which are integrated and are generating revenue, and have made the farmer nutritionally and financially secure. Farmers visited high-tech watermelon, lemon, tomato, papaya, ginger and pomegranate plantation plots. Farmers also visited the established vermi compost units, bio-gas setup and dairy setup of the lead farmers. Farmers also visited farm ponds and learned the benefits of having a pond farm in the field.



Farmers at lemon cultivation plot at Havnoor, Gulbarga taluk



Farmers at vermi compost unit at Gudur, Afzalpur Taluk



Farmers at high-tech watermelon cultivation plot at Gudur, Afzalpur taluk



Farmers at high-tech papaya cultivation plot at Halli, Basavkalyan taluk



Farmers visit to Biogas setup at Hudgi, Basavkalyan taluk



Farmers at farm pond at Halli, Basavkalyan taluk



Farmers' visit to agroforestry and fruit crop setup along the bunds of Mr. Gundappa field in Pattan village



Goat farm at Mr. Gundappa's farm; exhibiting the goat, sheroi variety which priced in the market Rs.18000/goat



Mr. Raju Teggelli, Programme Coordinator, KVK, explaining the farmers about the procedure to use the inputs in the vermi-compost units and selection of earthworm varieties



Farmers at biogas setup in KVK



Farmers at azolla cultivation setup of KVK



Dr. Ashok, Technical Expert, explaining the procedure to cultivate azolla, its usage, and benefits, at KVK

Table 2: IFS Components Selected by Farmers

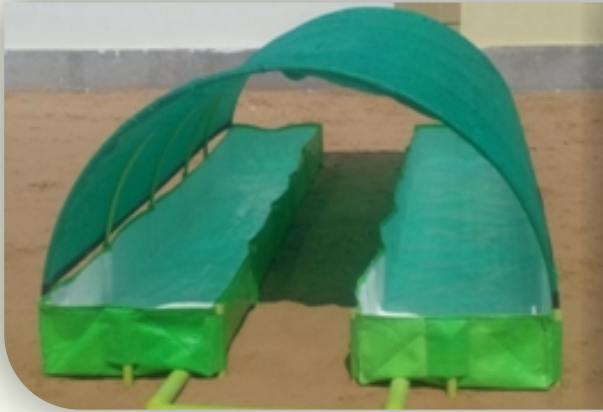
Sl No	Item	Benefit
1	Gravitational drip for 1 acre	As the area is heavily dependent on rainfall and the ground water level is also low, with this type of drip, the farmer can store available water in the tank and through that, water is provided to the crop in 1 acre using the low cost drip laterals
2	Vermibed	The farmer can use the farm waste like biomass, cow dung etc and compost it. While using the manure thus generated to his own field, the excess can be sold to the fellow farmers to earn money
3	Horticulture plants in 1 acre area: Lemon, Drumstick, Mango, Coconut, Custard Apple, Banana, Guava, Pomegranate, Sapota, Curry Leaves	Nutritionally and financially secure
4	Matka Pesticide Kits	The farmer can develop his own farm based pesticide and can avoid the excess use of chemical pesticide, thus contributing to environmental protection and controlling more amount of chemicals entering into the food chain
5	Goats	Highly income generative as these animals multiply fast i.e. 8 months gap for each gestation and every time the female gives birth to two offspring
6	Cow, buffalo	Diary - milk and its byproducts fetch good amount of income for the farmer

70 farmers have been selected for IFS interventions, and the following table provides a break up of numbers district-wise and year-wise:

Table 3: Number of IFS Farmers - District-wise and Year-wise

Financial Year	Gulbarga	Bidar	Total
2014	47	23	70
2015	50	20	70
2016	54	16	70

Some Important IFS Components:



Vermibed



Plant materials used to
prepare pesticide



Cement house to prepare and
store matka pesticide



Gravitational drip with tank



Drip laterals and fruit crop



Osmanabadi goat



Jersey cow

3. Training and Capacity-building on Crop Production and Market Integration

A total of 20 trainings on crop management including pre-sowing, IPM (Integrated Pest Management), and pre and post harvest were conducted. Trainings were conducted on topics related to various crop stages. Main components of the training were varietal selection, soil testing, Integrated Nutrient Management (INM) and IPM. Trainings were conducted with the support of scientists from local KVKs and the State Agriculture Department. A Training module has also been developed on Integrated Crop Management (ICM).



Pre-sowing training at Tadkal AVRC



Pre-sowing training at Gudur AVRC

Pre and Post harvest training



Training held on 02-12-2015 in Ankalaga village of Afzalpur taluk
Resource person: Mr. Ismail
No. of participants: 30



Training held on 02-12-2015 in Diksanga village of Afzalpur taluk
Resource person: Mr. Ismail
No. of participants: 30



Training held on 28-12-2015 in Gonal village of Raichur taluk
Resource person: Mr. Mohan Chavan, KVK
No. of participants: 30



Training held on 16-12-2015 in Patepur village of Raichur taluk
Resource person: Mr. Sujay Kumar Hurali, KVK
No. of participants: 30



Training held on 1-12-2015 in Gundarthi village of Chittapur taluk
Resource person: Mr. Premsing
No. of participants: 30



Training held on 3-12-2015 in Hosalli village of Chittapur taluk
Resource person: Mr. Premsing
No. of participants: 30



Training held on 4-12-2015 in Tonasnalli village of Chittapur taluk
Resource person: Mr. Premsing
No. of participants: 30

Under cross-learning and exposure visits, a total of 3 exposure visits was conducted. The objective of the visits was to connect project farmers with potential stakeholders in value chain and learning advancement on the technology front. Details of the exposure visits are as below:

Table 4: Exposure Visits for Farmers

S. No.	Description	Number of farmers	Date of Visits	Duration of Visit
1	NRCP, Solapur	30	18-09-2015	1 day
2	Krishimela, Bangalore	20	19th Nov to 22nd Nov 2015	3 days
3	Krishimela at KVK, Baramati district, Maharashtra	15	6th and 7th Nov 2015	2 days



Visit to KVK, Bangalore



Farmers visit to NRCP, Solapur



Farmers interacting with expert about PoP on pomegranate cultivation



Farmers visit goat centre at Solapur



Farmers visit to Murra buffalo dairy unit at Solapur

Bidar Krishimela - 11th,12th and 13th December 2015



A stall at Krishimela of UAS, KVK, Bidar. Displaying the red gram plants that have acquired best vegetative growth and huge number of pod formation due to various interventions of ISAP through inputs and sowing methodologies like pit method etc.



Dr.S.A. Patil explaining different methods on moisture conservation and sowing methodologies which will help farmers in overcoming the drought condition and having good yield in red gram.



Farmers going through the banners in the stall depicting the IFS benefits at the Krishimela.

Red gram Field day in Kon Melkunda village, Bhalki taluk, Bidar district – 28th December 2015



IFS based organic farming with red gram field day was held in Kon Melkunda village. Honorable VC, UAS Raichur Dr. Salimath, KVK and Department of Agriculture officials were present on this day. This field day was held to educate people about best practices to have more yield in red gram along with IFS farming benefits.



Farmers listening to the speech of the lead farmer Mr. Mahadev Nagure about benefits of IFS and better PoP for red gram.

Red Gram Field day in Hudgi village, Humnabad taluk, Bidar district – 28th December 2015



Red gram field day at Hudgi Block Demo plots. Dr. S.A. Patil interacting with the farmers and Vice Chancellor Dr. Salimath attending the event.

The field day was conducted to show the farmers, institutes and Government departments that with various technological interventions even in drought conditions, a good yield can be expected



Hudgi demo plots. The crop is ready to be harvested, and expected yield is 6 quintals against the common plot yield of 2 quintals under this drought condition.

Yield Analysis

Small Scale Demonstrations

This year 35 small scale demonstrations were planned but due to severe drought prevailing in the northern districts of Karnataka for consecutive 2 years, the Karnataka government has declared drought in 27 districts as it received 35 percent deficient rainfall. About 50 percent of the demo plots were either not sown or resulted in crop failure due to scanty rainfall. Rainfall pattern of the districts is shown in the table below. In Bidar and Raichur districts, all the demo plots survived whereas in Gulbarga only 2 demo plots survived in Chittapur block.

Table 5: District-wise Weighted Average Rainfall Pattern in Project Area

Sl.	District Name	Rainfall Pattern June 2015			Rainfall Pattern 1st July to 22nd July 2015			South-West Monsoon Rainfall Pattern 2015 (1st June to 22nd July)		
		Normal (mm)	Actual (mm)	%DEP	Normal (mm)	Actual (mm)	% DEP	Normal (mm)	Actual (mm)	% DEP
1	RAICHUR	80.7	35	-57	62.8	30.1	-52	143.5	65.1	-55
2	GULBARGA	113.3	64.2	-43	97.6	50.4	-48	210.9	114.7	-46
3	BIDAR	127.5	99.7	-22	124.1	53	-57	251.6	152.7	-39

Source: <http://nfsm.gov.in/>

Table 6: Effect of Drought on Sowing in Different Small Scale Demo Plots of Project Area

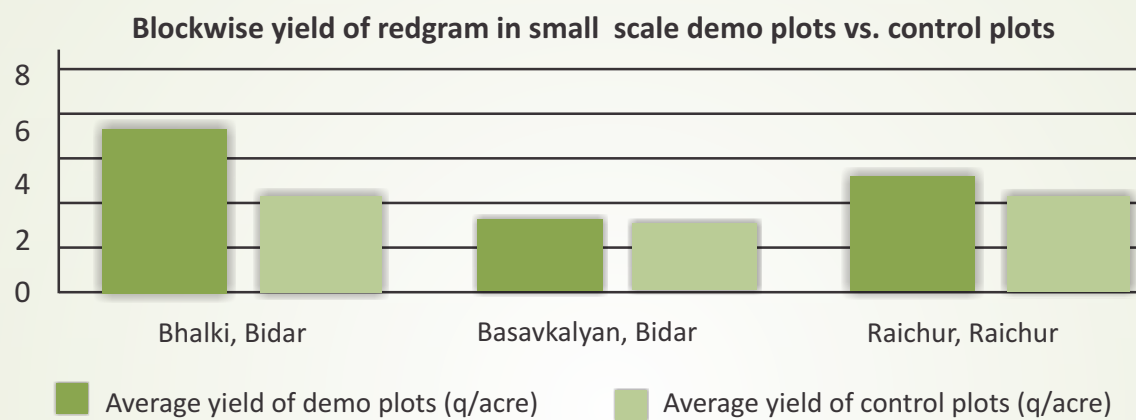
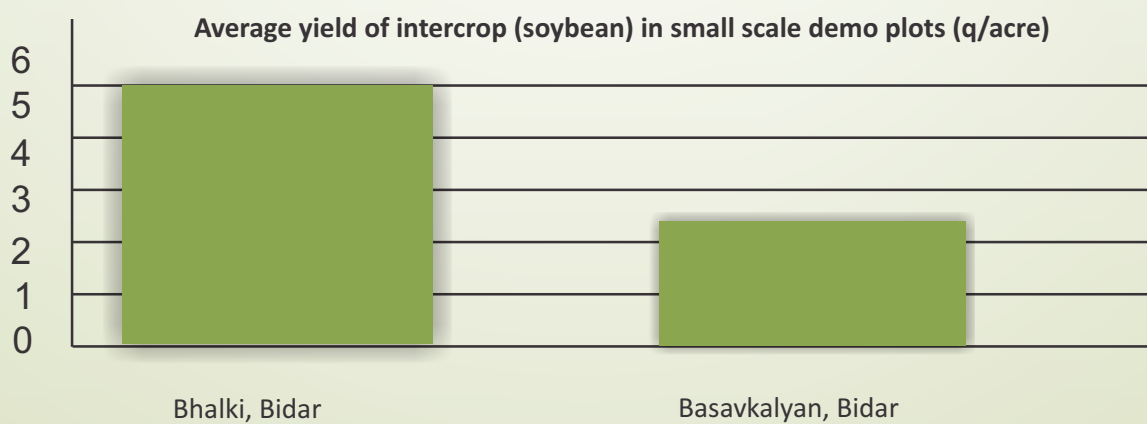
Block, District	Demo Plots	Survived Demo Plots	Not Sown	Crop Failure
Bhalki, Bidar	5	5	0	0
Basavkalyan, Bidar	5	5	0	0
Afzalpur, Gulbarga	10	0	2	8
Chittapur, Gulbarga	5	2	0	3
Aland, Gulbarga	5	0	5	2
Raichur, Raichur	5	5	0	0

The table below presents the average yield of small scale demo plots, control plots and intercrop. The seed varieties used for demonstrations were BSMR-736, ICPH-2740 and TS-3R. BSMR-736 and ICPH-2740 were used in Bidar district and TS-3R was used in Gulbarga and Raichur districts. The average yield of BSMR-736 was 4.2 q/acre and ICPH-2740 was 6 q/acre against average yield of 3 q/acre in control plot. The average yield obtained for TS-3R was 3.25 q/acre and 4.15 q/acre in Gulbarga and Raichur districts respectively, whereas in control plot the average yield was 3.5 q/acre in Raichur district.

Intercrop was taken only in Bidar district. Farmers were reluctant to take an intercrop since the state is facing drought for two years.

Table 7: Average Yield of Demo vs. Control Plots in Small Scale Demos

Block, District	Average Yield (q/acre)		
	SSD	Control Plot	Intercrop (Soybean)
Bhalki, Bidar	5.87	3.5	6.16
Basavkalyan, Bidar	2.6	2.5	1.92
Chittapur, Gulbarga	3.25	-	-
Raichur, Raichur	4.15	3.5	-

Graph 1**Graph 2**

Apart from varietal interventions, different seed sowing methods like dibbling, pit method and direct sowing were used. In dibbling, the raised beds are prepared with each spacing row to row 4 feet and plant to plant 1 foot. At a desired depth, seeds are inserted and covered. The benefits of this system are many, which include: moisture conservation; equal input distribution to the plant population; ability to have intercrop in suitable regions; and suitability for mechanical harvesting.

In pit method, raised beds with spacing similar to dibbling method is provided but, a small pit of 12 inches deep and 4 to 6 inches width is made and filled with hydrogel, sand, dap and vermicompost. A seed is placed and covered with soil and water initially. The benefit of pit method is that it creates a microenvironment for the plant with water and required nutrients to grow effectively.

On the other hand, in direct sowing, the spacing is: row to row 3 feet and plant to plant 1 foot. It is a traditional method and seed input per acre is also more compared to the other methods described previously. During the growth stage, there is competition among the plants for nutrition and water, ultimately leading to a negative impact on growth of the individual plant and yield as a whole.

The yield obtained through dibbling method was 7q/acre, 3.3 q/acre and 4.8 q/acre in Bhalki and Basvakalyan blocks of Bidar district and Raichur of Raichur district, respectively.

The yield obtained through pit method was 5 q/acre and 4.5 q/acre in Bidar and Raichur districts respectively.

In direct sowing, the yield was 5.7 q/acre, 2.4 q/acre, 3.3 q/acre and 3.6 q/acre in Bhalki, Basvakalyan blocks of Bidar, and Gulbarga and Raichur districts respectively.

Overall, the yield with the dibbling technique was better than pit and direct sowing methods.

Table 8: Yield in Different Sowing Techniques

Block, District	Yield (q/acre)		
	Dibbling	Pit Method	Direct Sowing
Bhalki, Bidar	7	5	5.7
Basavkalyan, Bidar	3.3		2.4
Chittapur, Gulbarga	-	-	3.3
Raichur, Raichur	4.8	4.5	3.6

Large Scale Demonstration

A total of 70 large scale demonstrations were planned this year but due to severe drought prevailing in the northern districts of Karnataka, about 57% of the demo plots were either not sown or resulted in crop failure. In Bidar and Raichur districts, all the demo plots survived whereas in Gulbarga none of the demo plots survived due to consecutive drought for 2 years.

Table 9: Effect of Drought on Sowing in Different Large Scale Demo Plots of Project Area

Block, District	Demo Plots	Survived Demo Plots	Not Sown	Crop Failure
Bhalki, Bidar	10	10	0	0
Basavkalyan, Bidar	10	10	0	0
Afzalpur, Gulbarga	20	0	0	20
Chittapur, Gulbarga	10	0	10	0
Aland, Gulbarga	10	0	10	0
Raichur, Raichur	10	10	0	0

The table below presents the average yield of large scale demonstrations, intercrop and control plot. Seed varieties used were BSMR-736 and TS-3R. In Bidar district, BSMR-736 was used and in Raichur district TS-3R variety was used. Average yield of BSMR-736 is 4.7 q/acre and that of TS-3R is 3.7 q/acre against average yield of 3 q/acre and 2.9 q/acre in control plot respectively.

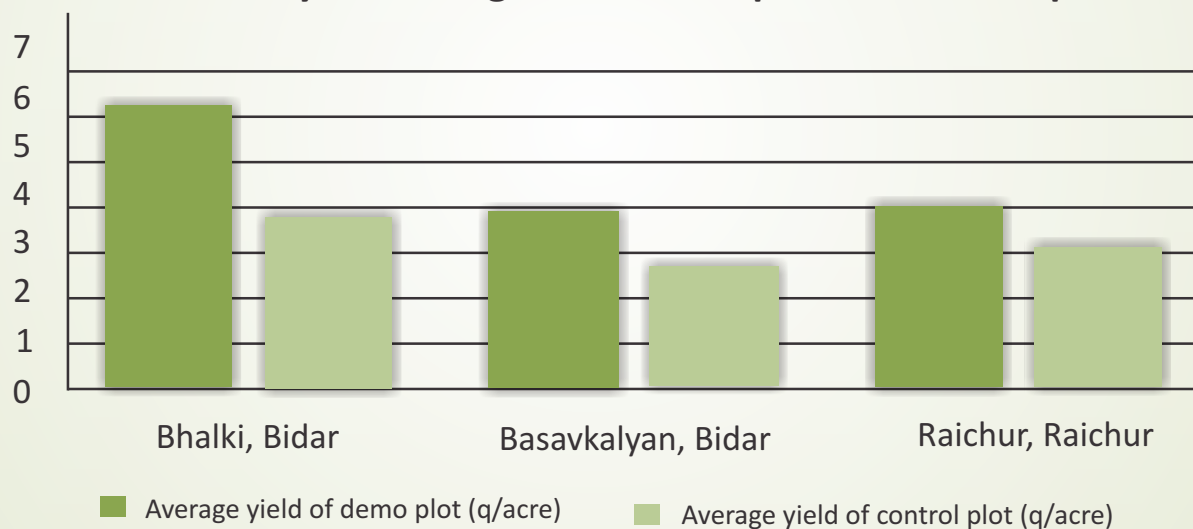
Intercrop was taken only in Bidar district because farmers were not ready to take further risk due to severe drought conditions. Average yield of intercrop is 3.35 q/acre.

Table 10: Yield in Large Scale Demos vs. Control Plots

Block, District	Average Yield (q/acre)		
	LSD	Intercrop (Soybean)	Control Plot
Bhalki, Bidar	5.8	5.2	3.5
Basavkalyan, Bidar	3.6	1.5	2.5
Raichur, Raichur	3.7	-	2.9

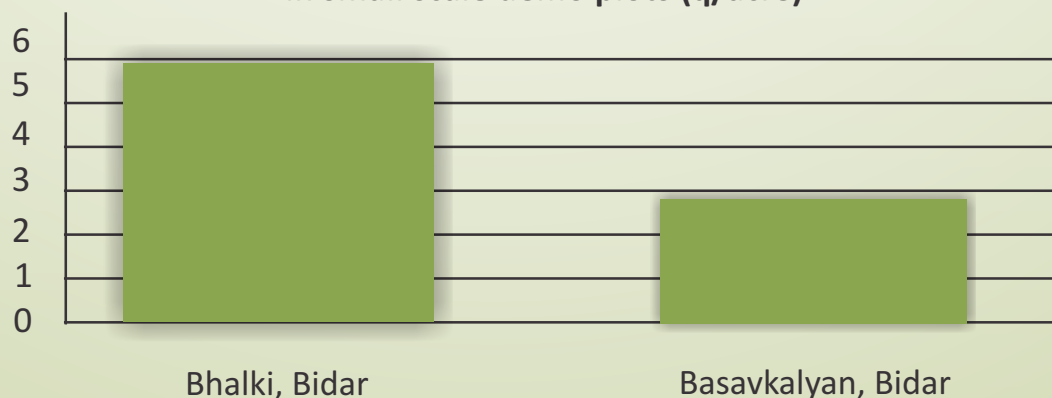
Graph 3

Block wise yield of large scale demo plots vs. control plot



Graph 4

Average yield of intercrop (soybean) in small scale demo plots (q/acre)



In large scale demo plots, four techniques of seed sowing were used: dibbling, pit method, chowk madi and direct sowing. In chowk madi method, in 12 feet x 12 feet area, 3 rows are prepared at a spacing of 4 feet. This is enclosed in a rectangular shaped trench so as to arrest rainwater runoff.

In dibbling technique average yield obtained was 5.25 q/acre in Bidar district (Bhalki block - 6.4 q/acre and Basvakalyan block 4.1 q/acre) and 4.3 q/acre in Raichur district and in pit method average yield obtained was 5.15 q/acre in Bidar district (Bhalki block - 6.5 q/acre and Basvakalyan block 3.8 q/acre) and 3.5 q/acre in Raichur district. The average yield obtained in chowk madi technique was 5 q/acre in Bidar district (Bhalki block 6.5 q/acre and Basvakalyan block 3.5 q/acre) and 3.5 q/acre in Raichur district whereas in direct sowing the average yield was 4.5 q/acre in Bidar district (Bhalki block 5.5 q/acre and Basvakalyan block 3.5 q/acre) and in Raichur district the yield was 3.7 q/acre.

Table 11: Yield in Different Sowing Techniques of Large Scale Demos

Block, District	Average Yield				
	Dibbling	Pit Method	Chowk Madi Method	Direct Sowing	Control Plot Yield
Bhalki, Bidar	6.4	6.5	6.5	5.5	3.5
Basavkalyan, Bidar	4.1	3.8	3.5	3.5	2.5
Raichur, Raichur	4.3	3.5	3.5	3.7	2.9

In some of the plots, DNP (Dynamic Nutrient Provider) and hydrogel were applied. DNP consists of organic fertilizer, micronutrients and microbial inoculants for better growth and yield. Hydrogel is a small granule which is placed near the seed. It holds the moisture and slowly releases it.

The average yield obtained where DNP was applied was 4.6 q/acre in Bidar district (Bhalki block 5.6 q/acre and Basvakalyan block 3.6 q/acre) and 3.7 q/acre in Raichur district whereas the plot where hydrogel was applied the yield obtained was 5.25 q/acre in Bidar district (Bhalki block 6.3 q/acre and Basvakalyan block 4.2 q/acre) and 3.8 q/acre in Raichur district.

Table 12: Yield in DNP vs. Hydrogel in Large Scale Demos

Block, District	Yield	
	DNP	Hydrogel
Bhalki, Bidar	5.6	6.3
Basavkalyan, Bidar	3.6	4.2
Raichur, Raichur	3.7	3.8

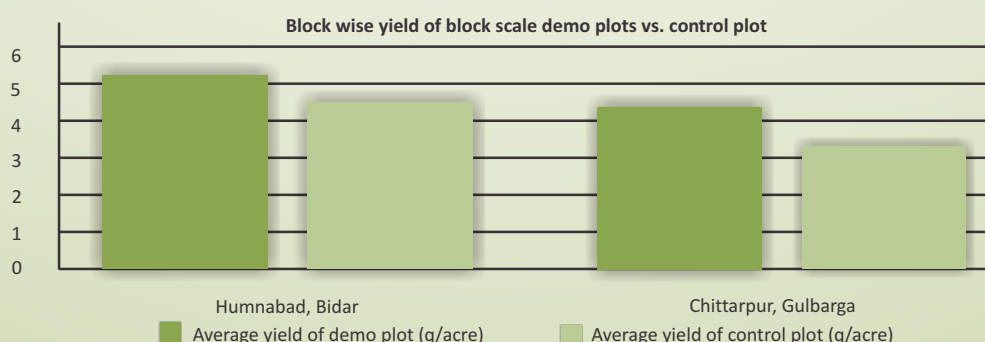
Block Scale Demonstrations

In block scale demonstrations, 30 demo plots were planned in Bidar and Gulbarga districts. The seed varieties used were BSMR-736 and TS-3R. BSMR-736 was sown in Bidar district and TS-3R in Raichur district. The average yield of BSMR-736 variety was 5.5 q/acre in Bidar district and that of TS-3R was 4.6 q/acre in Gulbarga district against average yield of 4.7 q/acre and 3.5 q/acre in control plot respectively.

Table 13: Yield of Demo vs. Control Plots in Block Scale Demos

Block, District	Demo Plot	Intercrop (soybean)	Control Plot
Humnabad, Bidar	5.5	3.5	4.7
Chittapur, Gulbarga	4.6	-	3.5

Graph 5



The tables below present the yield obtained under different seed sowing techniques used in the demo plot i.e. dibbling, pit method, chowk madi method and direct sowing. The highest yield was obtained in chowk madi method i.e. 6.9 q/acre and 5.9 q/acre in Bidar and Gulbarga districts respectively.

Table 14: Yield in Different Sowing Techniques of Block Scale Demos

Block, District	Average Yield				
	Dibbling	Pit Method	Chowk Madi Method	Direct Sowing	Contrd Plot
Humnabad, Bidar	5.7	6.8	6.9	5.2	4.7
Chittapur, Gulbarga	5.1	5.7	5.9	4.5	3.5

The average yield obtained where DNP was applied was 4.7 q/acre in Bidar district and 4.4 q/acre in Gulbarga district whereas the plot where hydrogel was applied the yield obtained was 4.7 q/acre in Bidar district and 4.4 q/acre in Gulbarga district.

Table 15: Yield in DNP vs. Hydrogel in Block Scale Demos

Block, District	Average Yield	
	DNP	Hydrogel
Humnabad, Bidar	4.7	4.4
Chittapur, Gulbarga	4.6	4.4

4. Use of ICT for Enhancing Production and Market Opportunities

Kisan Call Centre

The Kisan Call Centre is a combination of two technologies – the Information Communication Technology (ICT) as well as scientific agricultural technology that is derived after considerable scientific research.

During January and December 2015, KCC received close to 13,000 calls. About 29% calls were about technological aspects, 27.35% were about diseases and pest problems, and 25% were about fertilizers. The rest of the calls were related to seeds, livestock and other issues.

Table 16: Details of KCC Calls in 2015

Block	Jan	Feb	Mar	Apr	May	june	July	Aug	Sep	Oct	Nov	Dec	Total
Afzalpur	184	181	171	191	219	215	208	201	202	216	159	188	2335
Aland	181	191	183	178	204	190	191	194	168	201	139	111	2131
Chitapur	174	179	161	180	196	192	195	187	156	189	140	107	2056
Baswakalyan	177	180	184	191	209	200	205	180	163	207	151	106	2153
Bhalki	183	181	176	184	206	200	203	194	192	189	128	104	2140
Raichur	164	163	163	178	198	189	200	179	184	181	143	113	2055
Total	1063	1075	1038	1102	1232	1186	1202	1135	1065	1183	860	729	12870
Sector													
Seed	45	23	12	18	181	312	298	95	116	236	43	24	1403
fertilizer	236	301	246	226	274	265	364	423	352	198	156	188	3229
Disease / Pest	336	268	396	369	211	363	213	319	316	361	179	189	3520
Technological Aspects	368	421	342	432	506	143	223	217	154	295	408	243	3752
Live Stock	59	39	25	46	42	74	68	62	96	76	49	56	692
Other	19	23	17	11	18	29	36	19	31	17	25	29	274
Total	1063	1075	1038	1102	1232	1186	1202	1135	1065	1183	860	729	12870

Table 17: Details of KCC calls between January and March 2016:

Block	Jan	Feb	Mar
Afzalpur	169	82	29
Aland	97	72	26
Chitapur	95	79	26
Raichur	107	76	23
Baswakalyan	111	74	23
Bhalki	114	64	27
Other	107	86	29
Total	800	533	183
Sector			
Seed	0	1	5
fertilizer	247	130	36
Disease / Pest	123	52	21
Technological Aspects	387	295	98
Live Stock	41	48	19
Other	2	7	4
Total	800	533	183

Table 18: KCC Call Details for 2014 to 2016

Sl.No	Month	2014	2015	2016
1	January	3223	1063	800
2	February	3076	1075	533
3	March	3120	1038	183
4	April	3211	1102	
5	May	2646	1232	
6	June	2289	1186	
7	July	1926	1202	
8	August	1801	1135	
9	September	1538	1065	
10	October	1717	1183	
11	November	1395	860	
12	December	1228	729	
Total		27170	12870	1516

There has been a decrease in KCC calls of more than 50% in 2015 compared to 2014. This decrease is due to drought conditions in the project area. Farmers are unable to engage in crop production due to lack of water for irrigation.

ISAP's Krishi Gyan Programme

ISAP has developed an android-based Decision Support System (DSS) for extension agents. This DSS is named Krishi Gyan (KG), which literally means 'Agriculture Knowledge'. Extension agents carry tablets with installed KG applet, when they visit project farmers. This applet helps in diagnosing problems of probable pests or disease infestation in the farmer's field. The agent can access high resolution pictures of diseases and pest infestations for various crops along with description of symptoms and control measures. These pictures help in identifying problems in the field of the farmers. On diagnosis of the problem, the extension agent can provide on-the-spot solution to the farmers. In case problem is not identified with KG, the extension agent can send pictures of the infested crop part to a KCC (Kisan Call Centre) expert. The KCC expert can see these pictures on a web interface along with complete details of the farmers, like location (GPS coordinates), crop, phone number of farmer, etc. The experts accordingly provide advisory to the concerned farmer(s). KG also comprises animation videos on proven cropping techniques and advance farm technologies. Using these videos, the agents can educate farmers depending upon interest and need of project farmers in a manner commensurate with their comprehension levels. Currently, Krishi Gyan is available in Hindi (for Rajasthan) and Kannada (for Karnataka).

This application is also available on Google Play store

(<https://play.google.com/store/apps/details?id=com.mixorg.krishidarshan.activities>) and has got more than 10,000 downloads.

Agripole

For last mile delivery, a concept of Agripole has also been introduced. Through Agripole, the farmers can download the app without internet. When the farmer comes near the Agripole, he needs to switch on the bluetooth, select the particular crop app, click option download and the app gets downloaded on his phone.



AGRIPOLE in Regional Office
ISAP, Gulbarga, Karnataka



AGRIPOLE in
KVK, Bidar, Karnataka



AGRIPOLE in CHSC office,
Kamalnagar, Bidar, Karnataka



AGRIPOLE in Joint
Director of Agriculture's
office, Gulbarga, Karnataka

5. Strengthening FPOs' Agribusiness Activities, Value Addition and Market Integration

Agri Village Resource Centres (AVRCs) are an expanded version of the Agri Business Centre (ABC). The AVRCs have additional components like Primary Health Centre, Women's Skill Development Centre, Computer Education Centre and Children's Recreation Centre. Each FPO is registered and has an Agri Village Resource Centre (AVRC) with units as mentioned below to facilitate agribusiness and to work towards human resource development.

Table 19: AVRC Units

	Agribusiness Units		Social Development Units
1	Custom Hiring Service Centre	8	Computer Education Centre
2	Fertilizer sales	9	Women Training Centre
3	Pesticide sales	10	Primary Health Centre
4	Dal Mill		
5	Nursery		
6	Vermicompost		
7	Seed Business / Aggregation / Procurement		

Construction of AVRCs has been completed at 6 locations and the list is presented below:



Jai Kisan Sourdha Multipurpose Cooperative Society, Halbarga village, Bhalki taluk, Bidar district



Sri Basaveshwara Sourdha Multipurpose Society, Satsapur village, Basavkalyan block, Bidar district



Sri Annaveerabadhreshwara Chittapur farmers society, Hebbal village, Chittapur taluk, Gulbarga district



Dr.S.A. Patil Farmers Society, Ankalaga village, Afzalpur taluk, Gulbarga district



Afzalpur Farmers Federation, Gudur village, Afzalpur taluk, Gulbarga district



Negilayogi Aland Farmers Federation, Tadkla Village, Aland Taluk, Gulbarga district

7th Agri-village Resource Centre

The 7th AVRC is approved with its specialization in goat-rearing and this centre will be called as “Goat Resource Centre”. The proposed site for this AVRC is Aurad in Kalaburagi district, Karnataka. The objectives of this centre are as mentioned below:

Objectives:

- To train the farmers in stall-fed goat rearing techniques
- To provide goats to small and marginal farmers at reasonable rates
- To exemplify the profitability of goat-rearing by scientific method
- To demonstrate community-owned business ventures
- To sharpen the farmers’ federation management, accounting and marketing skills

Goat Resource Centre (GRC) capacity:

The GRC will have the capacity to rear 300 goats with proper feed, medication, shelter and protection. The GRC will have infrastructure which will be spread in an area of 8100 sq ft.

6. Tackling Major Human Development Issues in Project Areas

In addition to developing agriculture production, agribusiness and marketing in project districts, the project strengthens interventions by adding a component of human development. Human development issues are addressed by the project by laying emphasis on education of adults and children, health, women empowerment, and any other issues of importance to rural communities in project areas. Women Self Help Groups' creation, skill improvement, and revenue generating activities have also been facilitated. In this direction, 105 groups have been formed with a total of 2100 women members. Each FPO has 300 women members i.e. 15 Women SHG groups, with each group having different skill sets varying from food processing, tailoring, dairy, poultry etc. These groups have been reviewed and skill assessment has been completed. Project titles of individual groups, proposed by women have been finalized as well. The next step is to form the Federation of these Women SHGs. Thus far, Women Federation for 1 FPO has been approved by NABARD.

Each Agri Village Resource Centre (AVRC) has the below mentioned units with the basic objective of tackling major HRD issues like health and education with priority to women and children.

Social Development Units

Computer Education Center

Women Training Center

Primary Health Center

Children Recreation unit

Social Development Units

Computer Education Center:

In all the 6 AVRCs, the Computer Education Centre is facilitated with branded computers, UPS, comfortable seating arrangements, and highly trained and motivated tutors. In Bidar, these centres are engaged with an IT company – “Mindssolvit” which is a top-rated software testing company, and is responsible to train the tutor. In Bidar, these computer centres are engaged with “Vani Infotech” which has very good background in training candidates in basics as well as computer diploma courses. The tutor is provided with a curriculum and at the end of the training program, the candidates are supposed to receive certificates.



Gudur AVRC computer center



Halbarga AVRC computer center

In the Computer Education Centre, there are a minimum of 30 students learning computer basics and MS Office etc. The fee for computer classes is subsidized at 50% compared to regular computer education centre fees.

Women Training Center

Similarly, in the villages that fall under the project FPOs, Women's Self Help Groups have been formed to train them in vermicelli-making, tailoring, candle-making, agarbatti-making, micro finance etc, and enable them financially to support their families. Nearly 1000 women members (7 FPOs and 142 per FPO) have been directly benefitted by these facilities. The Women Training Centre unit of each AVRC is assigned to one Women SHG group which specializes in tailoring.



Hebbal AVRC Women training center

Primary Health Center:

Through the Primary Health Centre, free health camps have been conducted. These camps serve a minimum of 200 villagers in each health camp at each AVRC and adjoining villages, attending to their medical issues. These camps have a facility with a nurse, and medicines are provided to the farmers as well.

These health centres are engaged with Sahaya Charitable Trust and the founders of the Trust are doctors by profession. This Trust selects and appoints the nurse whose salary is paid by ISAP. The Trust supplies medicines and monitors the nurse and interacts with the farmer community. Feedback from the farmers is also invited to improve the services further.

Several trainings of community members have been organized on health, hygiene, girls' education and women



Lecture on importance of usage of pure drinking water in Aurad (B), Gulbarga taluk, Gulbarga



Dr. Mahesh giving lecture on girls' education, eradication of female feticide, nutritional aspect of pregnant woman and new mothers and other health aspects in Aurad (B),



Mr. B.R. Patil, MLA, Aland taluk giving lecture on importance of education to girls, health and hygiene within the house and village in Khajuri, Aland taluk, Gulbarga district



Gram Panchayat President giving lecture on community participation of women, cottage industries, health, hygiene and education in Khajuri, Aland taluk, Gulbarga district



Dr. Manjunath, MBBS explaining the importance of health and hygiene to the farmers at Gudur



Farmer community attending the training at Gudur



Farmers' community training on health, hygiene, girls' education and women empowerment in Hebbal, Chittapur taluk, Gulbarga district



Medical Camps

A total of 7 medical camps have been organized in 2015 benefiting 1904 people. For sensitization of people on health issues, rallies were also conducted at village level. School children actively participated in these rallies. These children shouted slogans and carried banners with information about health camps and other health and hygiene related information like 'smoking is injurious to health', 'educate girl child' and 'maintain cleanliness'.

Table 20: Medical Camp Details

SI No	Location	District	Date	Number of Beneficiaries
1	Awarad (B), Gulbarga	Gulbarga	20.09.2015	280
2	Hebbal, Chittapur	Gulbarga	21.09.2015	260
3	Khajuri, Aland	Gulbarga	28.09.2015	270
4	Gudur, Afzalpur	Gulbarga	03.10.2015	275
5	Janwad, Chikodi	Belgaun	25.10.2015	273
6	Ankalga, Gulbarga	Gulbarga	22.11.2015	258
7	Sastapur, Basavkalyan	Bidar	05.12.2015	288
	Total			1904



Health rally by school children in Gudur village



Medical camp at Gudur AVRC



Health rally by school children in Aurad village



Medical camp at Aurad AVRC

Children's Recreation Units

Children's Recreation Units are installed in all the AVRCs for children to play and become strong physically and relaxed mentally. This unit has a swing, see saw, slide, single bar and a double bar.



7. Convergence with Other Stakeholders

Schemes to Strengthen Market Integration

The convergence of the initiatives with existing government schemes, bank schemes, private and corporate schemes provides the basis for expanding the business universe of the FPOs formed and also the overall community development process. As far as scanning of various public-private schemes is concerned, efforts are being made to use government of India's SFAC - as a resource for Venture Capital Scheme, to have large-scale projects like jaggery unit, organic compost and vermi-compost units.

Successful convergence of FPOs is done with a very ambitious scheme of Custom Hiring Service Centre (CHSC) initiated by the State Agriculture Department of Karnataka. These CHSCs will be run by Farmer Producer Organizations (FPOs) set up by ISAP in these regions. Each CHSC is provided agriculture machineries as per recommendation of farmers' committee and district agriculture department. A baseline survey was also done at each location to assess the requirement of the farmers in respective areas. These machineries include 50 hp and 39 hp tractors, power rotavator, combine harvester, JCB excavator and other agricultural equipment. These custom hiring centres will provide farm machinery on rental basis to farmers who cannot afford to purchase high-end agricultural machinery.

8. Creation of FPO Federation in North Karnataka

Karnataka Farmers Maha Society (KFMS), Gulbarga has been created with the following features:

- All 7 OCPF FPO presidents are in the BOD
- The Maha Society is acting as catalyst
- Facilitates each FPO under it project conception to implementation
- Provides technical support to monitor and sustain respective projects
- Provides market linkages through Urban Outlets
- Act as a bridge between vendors/customers and the FPOs

Karnataka Farmers Maha Society (KFMS) is working towards sustainability, and with all OCPF-AES FPO Presidents and ISAP staff in BOD, KFMS is well equipped.

KFMS's present activities

- To enable each FPO to have geographical and market suitable agribusiness
- To expand its scope by undertaking major business activities like 7th AVRC – the Goat Resource Center, KISAN FRESH - Urban outlet, Agri-input distributions, minor food processing, consultation etc
- Promote entrepreneur model for each activity of the FPO wherein the entrepreneur will be the member of the respective FPO

9. New Initiative under Market Integration: Kisan Fresh (Producer to Consumer)

KISAN FRESH

The Urban Outlet of the FPOs formed has been revamped and has been fine-tuned based on the learnings. Some highlights of the Urban Outlet are mentioned below:

Kisan Fresh – Farm to Fork Initiative of 'Karnataka Farmers Maha Society'

- Karnataka Farmers Maha Society (KFMS), Kalaburagi with the support of its promoting institution Indian Society of Agribusiness Professionals (ISAP) has setup “KISAN FRESH”, at Kanni Market, Kalaburagi
- Currently selling vegetables, jaggery and red gram pulses through Kisan Fresh
- Plan to sell fruits, rice, ground nut and women SHG group products like vermicelli, pickles, papad etc
- As of now, 8 hotels and an apartment complex where 100 families live is being served by KISAN FRESH
- The IFS farmers’ of OCPF-AES project and other farmers in this project area are connected

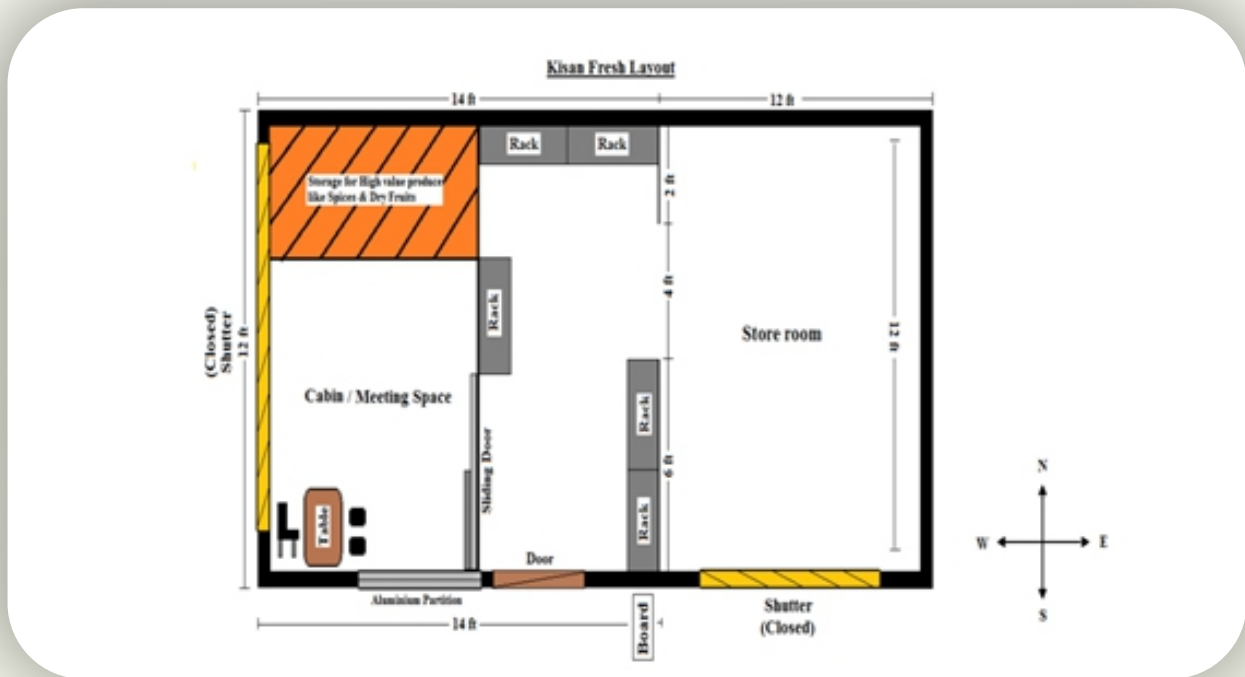
Sl No	Item	Quantity
1	Toor Dal	1840 kg
2	Organic Jaggery	69 kg
3	Cauliflower	200 kg
4	Cabbage	30 kg
5	Tomato	500 kg
6	Onion	5000 kg
7	Green Chilly	100 kg
8	Corriender	600 bunches
9	Palak	600 bunches
10	Beans	20 kg
11	Gajar	50 kg
12	Cucumber	100 kg
13	Spring onion	100 kg
14	Pudina	20 bunches
15	Lemon	1000 nos
16	Potato	1000 kg
17	Capsicum	60 kg
18	Methi	200 bunches



Glimpses of Kisan Fresh



The Kisan Fresh facility is revamped and the new layout is provided below. A vehicle dedicated to this unit has been purchased and its detail also provided below.



With the new layout ISAP has provision to store the high value commodities like spices, dry fruits etc and also a cabin to meet and discuss about the progress, business initiations etc of all the FPOs.

Annexure 1:

Soil Health Status 2015 – Detailed Report

Soil samples were collected from fields of project farmers in six blocks of three districts of Karnataka. The details of number of samples collected from each block are as below (Table 1):

Table A: Details of soil samples collected from the project area in Karnataka

District	Block	Number of samples
Gulbarga	Afzalpur	128
	Aland	77
	Chitapur	70
Bidar	Basavkalyan	63
	Bhalki	63
Raichur	Raichur	66
Total		467

Soil samples were analyzed for soil pH, electrical conductivity and available nutrient contents. These included three macro nutrients (N, P, K), one secondary (S) and four micronutrients (Zn, Fe, B and Mo). The results obtained were as below:

Available Nitrogen (N)

Soil nitrogen is considered sufficient if available nitrogen content is more than 560 Kg per hectare. Table 2 below depicts range (Minimum and Maximum) and mean of soil available N content, and Table 3 gives percentage of soil samples in different categories of nutrient availability. Soils coming under low and medium categories need supplemental doses of fertilizers. Soils in high category (> 560 Kg/ha) generally do not need additional supply of N through fertilizers.

Table B: Range and mean of available Nitrogen content in soils of different blocks of the project area:

District	Block	Number of samples
Gulbarga	Afzalpur	128
	Aland	77
	Chitapur	70
Bidar	Basavkalyan	63
	Bhalki	63
Raichur	Raichur	66
Total		467

Table C: Number of soil samples (%) in different categories of Nitrogen availability:

Block	Low (< 280 Kg/ha)	Medium (280-560 Kg/ha)	High (>560 Kg/ha)	
District Gulbarga				
Afzalpur	100	-	-	100
Aland	100	-	-	100
Chitapur	100	-	-	100
District Bidar				
Bhalki	100	-	-	100
Basavkalyan	100	-	-	100
District Raichur				
Raichur	100	-	-	100

Available N content varied from 42.9 – 251.7, 33.2 – 237.2, and 81.8 – 203.7 Kg/ha in Gulbarga, Bidar and Raichur district respectively. All the samples were low in available N and none of the soil samples in all the six blocks had more than the cut-off point of 560 Kg/ha and so all the fields required to be supplied with Nitrogen through fertilizers.

Available Phosphorus (P)

If available P content in soil is more than 25 Kg P/ha, such soil is considered rich in phosphorus for pigeon pea crop. Soils having less than 25 Kg P/ha need to be supplied with phosphatic fertilizers.

Table 4 below depicts range (Minimum and Maximum) and Mean of soil available Phosphorus content, and Table 5 gives percentage of soil samples in different categories of P nutrient availability. Soils coming under low and medium categories need supplemental doses of fertilizers. Soils in high category (> 25 Kg/ha) generally do not need additional P supply through fertilizers.

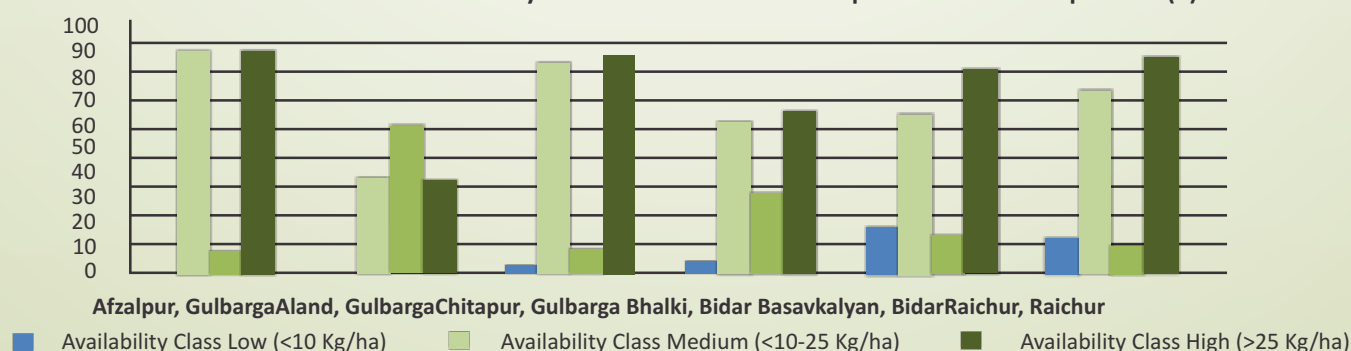
Table D: Range and mean of Available P content in soils of different blocks of the project area

Block	Soil Available P (Kg/ha)		
	Minimum	Maximum	Mean
District Gulbarga			
Afzalpur	10.9	39.4	19.4
Aland	13.0	52.7	27.6
Chitapur	8.8	48.2	19.2
District Bidar			
Bhalki	8.9	52.3	23.9
Basavkalyan	2.6	92.0	21.9
District Raichur			
Raichur	6.8	33.6	16.5

Table E: Number of soil samples (%) in different categories of P availability

Block	Availability Class			Below cut-off point (Require fertilizer)
	Low (< 10 Kg/ha)	Medium (10-25 Kg/ha)	High (>25 Kg/ha)	
District Gulbarga				
Afzalpur	0	91.4	8.6	91.4
Aland	0	39.0	61.0	39.0
Chitapur	2.9	87.1	10.0	90.0
District Bidar				
Bhalki	4.8	61.9	33.3	66.7
Basavkalyan	19.0	65.1	15.9	84.1
District Raichur				
Raichur	13.8	75.4	10.8	89.2

Blockwise status of availability class for number of soil samples tested for Phosphorous (P)



Available P content varied from 8.8 – 52.7, 2.6 – 92.0, and 6.8 – 33.6 Kg/ha in Gulbarga, Bidar and Raichur districts respectively. Except Aland block, most of the samples were either in low or medium category. While 66.7 to 91.4 percent fields in Afzalpur, Chitapur, Bhalki, Basavkalyan and Raichur blocks needed P fertilizers, only 39.0% fields in Aland block required supplemental doses of P fertilizers.

Available Potassium (K)

If available K content in soil is more than 280 Kg/ha, such soil is considered rich in Potassium for pigeon pea crop. Soils having less than this cut-off level require to be supplied with Potash fertilizers.

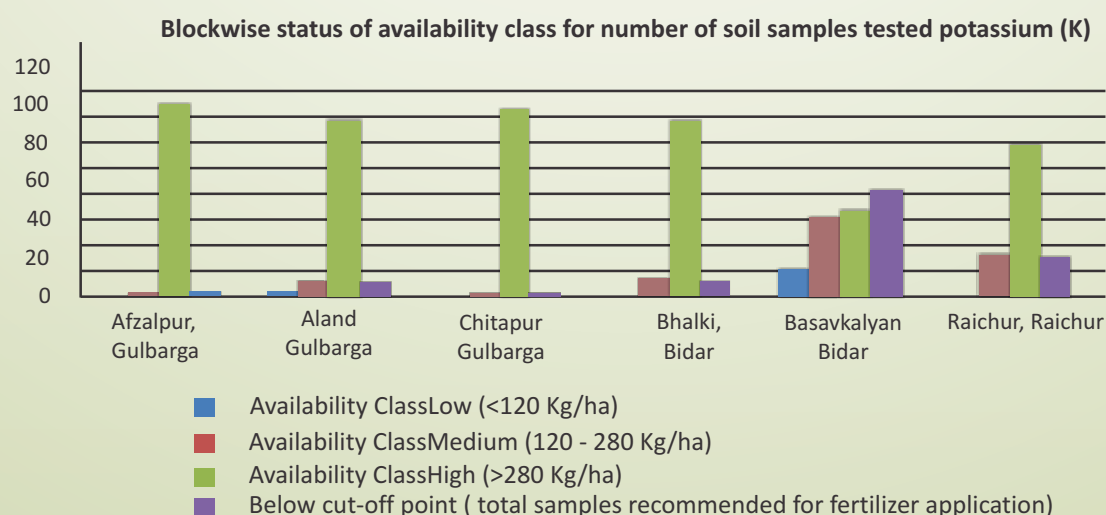
Data in Table 6 depicts range (Minimum and Maximum) and Mean of available K content and Table 7 gives percentage of soil samples in different categories of P nutrient availability. Soils in high category (> 280 Kg/ha) generally do not need additional K supply through fertilizers.

Table F: Range and Mean of available Potassium content in soils of different blocks of the project area:

Block	Soil Available K (Kg/ha)		
	Minimum	Maximum	Mean
District Gulbarga			
Afzalpur	230.4	797.4	501.4
Aland	105.2	793.0	546.4
Chitapur	232.2	811.0	584.9
District Bidar			
Bhalki	126.4	1089.2	542.9
Basavkalyan	15.0	890.8	292.7
District Raichur			
Raichur	153.2	1207.4	442.2

Table G: Number of soil samples (%) in different categories of K availability

Block	Availability Class			Below cut-off point (Require fertilizer)
	Low (< 120 Kg/ha)	Medium (120-280 Kg/ha)	High (>280 Kg/ha)	
District Gulbarga				
Afzalpur	0	0.8	99.2	0.8
Aland	1.3	7.8	90.9	9.1
Chitapur	0	1.4	98.6	1.4
District Bidar				
Bhalki	0	7.9	92.1	7.9
Basavkalyan	14.3	41.3	44.4	55.6
District Raichur				
Raichur	0	21.2	78.8	21.2



Available K content varied from 105.7 – 811.0, 15.0 – 1089.2, and 153.2 – 1207.4 Kg/ha in Gulbarga, Bidar and Raichur districts respectively. In general, soils were rich in available K content. Only Basavkalyan soils were relatively poor in K content, wherein more than 55% soils needed K fertilizer. In other blocks, 78-99% soils were rich in available K and so did not require K fertilizers.

Available Sulfur (S)

Sulfur is a secondary plant nutrient important for legumes and oilseed crops. If available S content in soil is more than 40 Kg/ha, such soil is considered rich in S for pigeon pea crop. Soils having less than 40 Kg S/ha require to be supplied with gypsum or elemental sulfur.

Data in Table 8 depicts range (Minimum and Maximum) and Mean of available S content and Table 9 gives percentage of soil samples in different categories of S nutrient availability. Soils in high category (> 40 Kg/ha) generally do not need additional S supply through fertilizers.

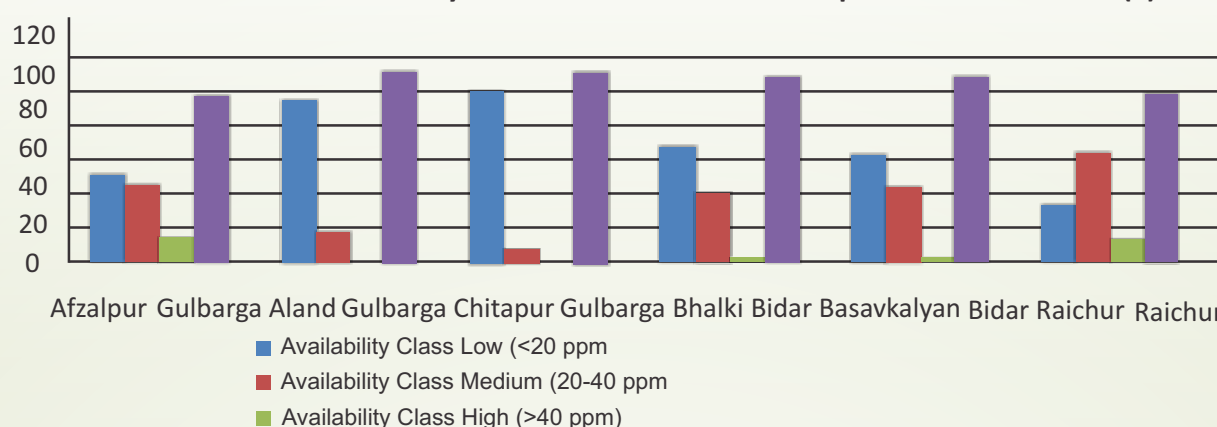
Table H: Range and mean of available Sulfur content in soils of different blocks of the project area

Block	Soil Available S (ppm)		
	Minimum	Maximum	Mean
District Gulbarga			
Afzalpur	7.8	75.0	24.9
Aland	7.0	28.7	15.3
Chitapur	4.6	44.1	13.3
District Bidar			
Bhalki	10.0	52.5	20.0
Basavkalyan	9.6	50.9	20.9
District Raichur			
Raichur	10.4	53.7	26.0

Table I: Number of soil samples (%) in different categories of Sulfur availability

Block	Availability Class			Below cutoff point (Require fertilizer)
	Low (< 20 ppm)	Medium (20-40 ppm)	High (>40 ppm)	
District Gulbarga				
Afzalpur	46.1	40.6	13.3	86.7
Aland	84.4	15.6	0	100
Chitapur	90.0	8.6	1.4	98.6
District Bidar				
Bhalki	60.3	36.5	3.2	96.8
Basavkalyan	57.1	39.7	3.2	96.8
District Raichur				
Raichur	30.3	57.6	12.1	87.9

Blockwise status of availability class for number of soil samples tested for Sulfur (S)



Available S content varied from 4.6 – 75.0, 9.6 – 52.5, and 10.4 – 53.7 ppm in Gulbarga, Bidar and Raichur district soils respectively. In general, most of the soils in all the six blocks were low to medium in available S content and so 86-100 % soils needed supplemental doses of S through application of amendments like gypsum.

Available Zinc

More than 0.6 PPM of available Zn content in soil is considered sufficient for growing Pigeon pea crop. Soils having less than this cut-off level require to be supplied with supplemental dose of Zinc.

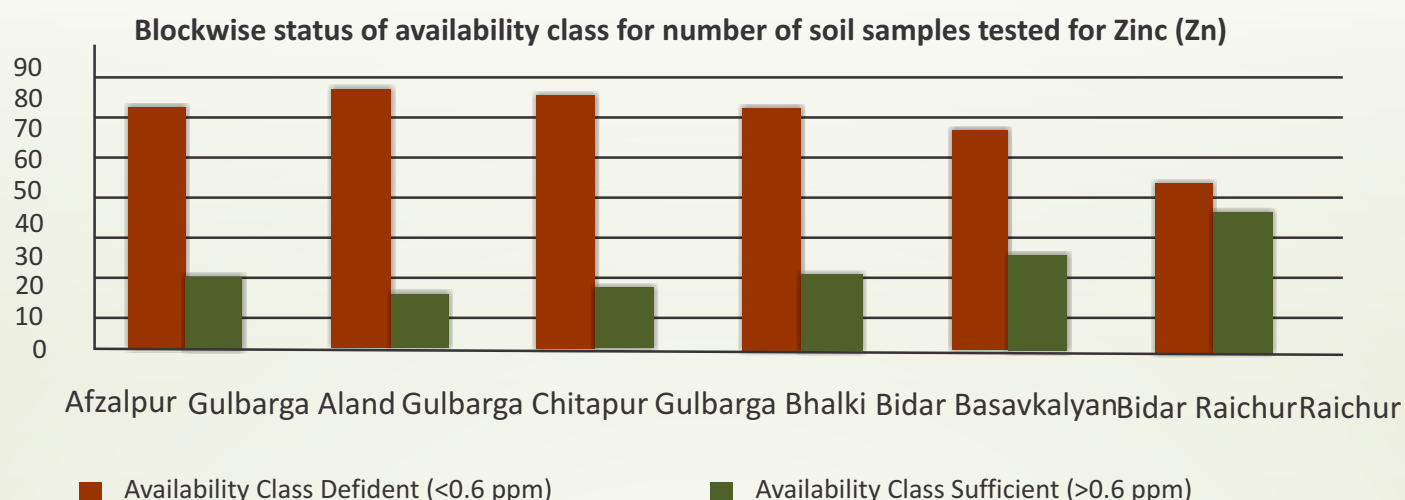
Data in Table 10 depicts range (Minimum and Maximum) and Mean of available Zn content and Table 11 gives percentage of soil samples in different categories of Zn nutrient availability. Soils in sufficient category (> 0.6 ppm) generally do not need additional Zn supply through fertilizers.

Table J: Range and mean of Available Zinc content in soils of different blocks of the project area

Block	Soil Available Zn (ppm)		
	Minimum	Maximum	Mean
District Gulbarga			
Afzalpur	0.23	2.11	0.52
Aland	0.21	1.10	0.52
Chitapur	0.22	1.35	0.51
District Bidar			
Bhalki	0.25	3.57	0.68
Basavkalyan	0.24	2.70	0.56
District Raichur			
Raichur	0.29	2.44	0.73

Table K: Number of soil samples (%) in different categories of Zinc availability

Block	Availability Class	
	Deficient (<0.6 ppm)	Sufficient (>0.6 ppm)
District Gulbarga		
Afzalpur	77.3	22.7
Aland	83.1	16.9
Chitapur	81.4	18.6
District Bidar		
Bhalki	76.2	23.8
Basavkalyan	69.8	30.2
District Raichur		
Raichur	54.5	45.5



Available Zn content varied from 0.21 – 2.11, 0.24 – 3.57, and 0.29 – 2.44 ppm in Gulbarga, Bidar and Raichur district soils respectively. Though average Zn content was more than cut-off value of 0.6 ppm, majority (54.5 – 83.1%) of the soils in each block were deficient in available Zn and so needed supplemental doses of Zn through application of Zn fertilizers like Zinc Sulfate.

Available Iron (Fe)

More than 4.5 PPM of available Fe content in soil is considered sufficient for growing Pigeon pea crop in calcareous soils. For non-calcareous soils, the cut-off point is 2.5 ppm. Soils having less than this cut-off level require to be supplied with supplemental dose of Fe.

Data in Table 12 depicts range (Minimum and Maximum) and Mean of available Fe content and Table 13 gives percentage of soil samples in different categories of Fe nutrient availability. Soils in sufficient category (>4.5 ppm) generally do not need additional Zn supply through fertilizers.

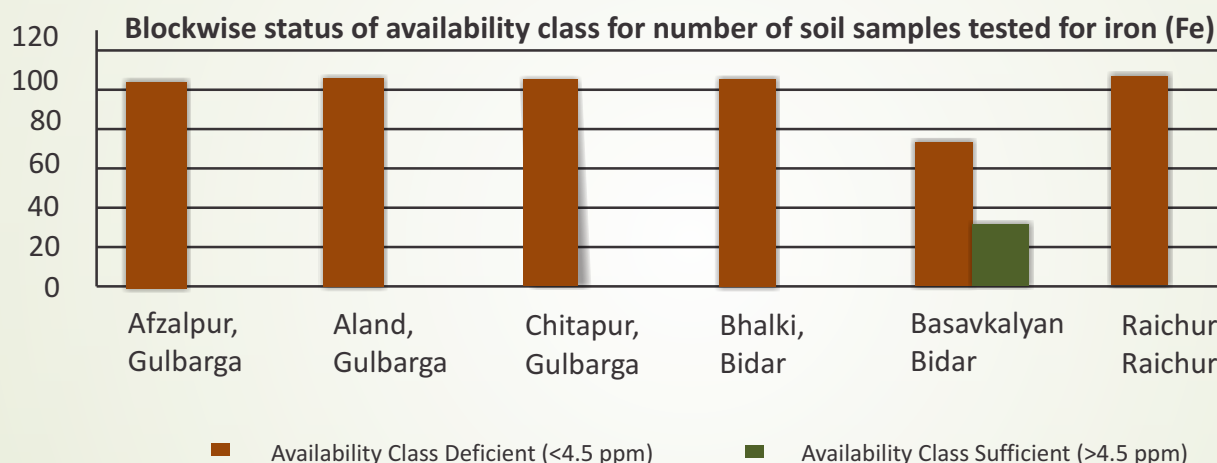
Table L: Range and mean of available Iron (Fe) content in soils of different blocks of the project area

Block	Soil Available Fe (ppm)		
	Minimum	Maximum	Mean
District Gulbarga			
Afzalpur	0.20	2.08	1.10
Aland	0.53	1.79	1.00
Chitapur	0.41	1.84	1.04
District Bidar			
Bhalki	0.38	2.33	1.07
Basavkalyan	0.61	6.59	2.94
District Raichur			
Raichur	0.56	3.47	1.16

Table M: Number of soil samples (%) in different categories of Iron availability

Block	Availability Class	
	Deficient (<4.5 ppm)	Sufficient (>4.5 ppm)
District Gulbarga		
Afzalpur	100	0
Aland	100	0
Chitapur	100	0
District Bidar		
Bhalki	100	0
Basavkalyan	69.8	30.2
District Raichur		
Raichur	100	0

Available Fe content varied from 0.20 – 2.08, 0.38 – 6.59, and 0.56 – 3.47 ppm in Gulbarga, Bidar and Raichur district soils respectively. Average Fe content was quite lower than cutoff value of 4.5 ppm. Almost all soils were Fe deficient in district Gulbarga, Raichur and Bhalki block of Bidar district. In Basavkalyan block also about 70% soils were Fe deficient and so needed supplemental doses of Fe through application of Fe fertilizers like Ferrous Sulfate.



Boron (B)

More than 0.5 PPM of available Boron content in soil is considered sufficient for growing Pigeon pea crop. Soils having less than this cut-off level require to be supplied with supplemental dose of B.

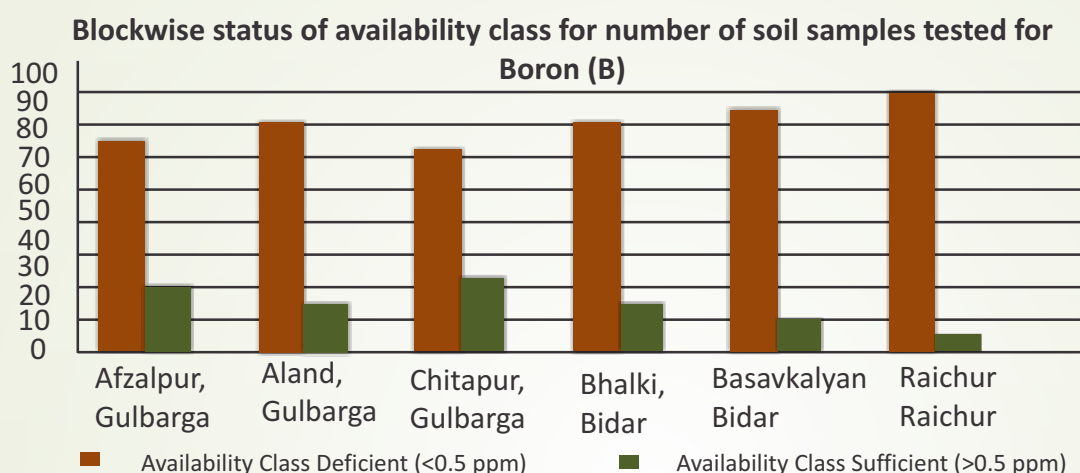
Data in Table 14 depicts range (Minimum and Maximum) and Mean of available B content and Table 15 gives percentage of soil samples in different categories of B nutrient availability. Soils in sufficient category (> 0.5 ppm) generally do not need additional B supply through fertilizers.

Table N: Range and mean of available Boron content in soils of different blocks of the project area

Block	Soil Available Boron (ppm)		
	Minimum	Maximum	Mean
District Gulbarga			
Afzalpur	0.16	0.98	0.42
Aland	0.17	0.69	0.40
Chitapur	0.22	0.87	0.42
District Bidar			
Bhalki	0.23	0.66	0.41
Basavkalyan	0.23	0.65	0.38
District Raichur			
Raichur	0.12	0.63	0.33

Table O: Number of soil samples (%) in different categories of Boron availability

Block	Availability Class	
	Deficient (<0.5 ppm)	Sufficient (>0.5 ppm)
District Gulbarga		
Afzalpur	75.8	24.2
Aland	83.1	16.9
Chitapur	72.9	27.1
District Bidar		
Bhalki	82.5	17.5
Basavkalyan	87.3	12.7
District Raichur		
Raichur	93.9	6.1



Available B content varied from 0.16 – 0.98, 0.23 – 0.66, and 0.12 – 0.63 ppm in Gulbarga, Bidar and Raichur district soils respectively. Average B content was less than cut-off value of 0.5 ppm in all the six blocks and majority (73 – 94%) of the soils in each block were deficient in available B and so needed supplemental doses of B through application of B containing fertilizers.

Molybdenum (Mo)

Molybdenum is an essential micronutrient required for nodulation in root system and for protein synthesis in pulse crops. This is required in very small quantities. Soils having more than 0.02 PPM Mo are considered sufficient in this micronutrient.

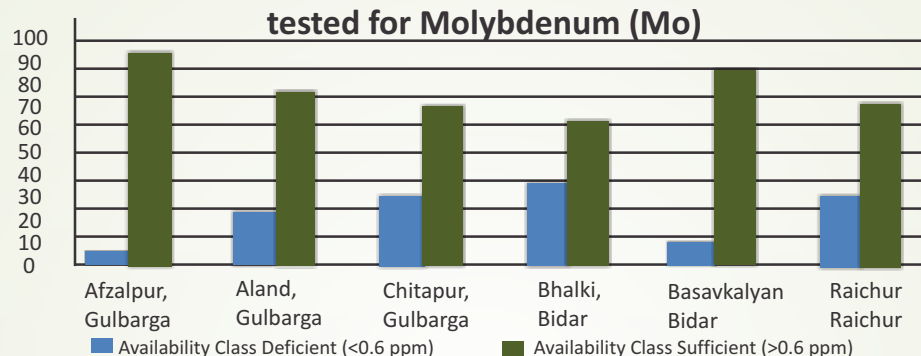
Data in Table 16 depicts range (Minimum and Maximum) and Mean of available Mo content and Table 17 gives percentage of soil samples in different categories of Mo nutrient availability. Soils in sufficient category (> 0.02 ppm) generally do not need additional Mo supply through fertilizers.

Table P: Range and mean of available Mo content in soils of different blocks of the project area:

Block	Soil Available Mo (ppm)		
	Minimum	Maximum	Mean
District Gulbarga			
Afzalpur	0.01	0.22	0.03
Aland	0.01	0.06	0.03
Chitapur	0.01	0.06	0.03
District Bidar			
Bhalki	0.01	0.06	0.03
Basavkalyan	0.01	0.04	0.02
District Raichur			
Raichur	0.01	0.06	0.03

Table Q: Number of soil samples (%) in different categories of Mo availability

Block	Availability Class	
	Deficient (<0.6 ppm)	Sufficient (>0.6 ppm)
District Gulbarga		
Afzalpur	7.0	93.0
Aland	24.7	75.3
Chitapur	30.0	70.0
District Bidar		
Bhalki	36.5	63.5
Basavkalyan	11.1	88.9
District Raichur		
Raichur	30.3	69.7

Blockwise status of availability class for number of soil samples tested for Molybdenum (Mo)

Available Mo content varied from 0.01 – 0.22, 0.01 – 0.06, and 0.01 – 0.06 ppm in Gulbarga, Bidar and Raichur district soils respectively. Majority (63.5 – 93.0%) of the soils in each block were sufficient in available Mo content. However about 25-35% soils in four blocks namely Aland, Chitapur, Bhalki and Raichur were deficient in available Mo and so needed supplemental doses of Mo through application of Molybdenum containing fertilizers. Mo deficiency was minimal (7-11%) in Afzalpur and Basavkalyan blocks. It is important to note that though Mo is a micronutrient required in very small quantities, there are some pockets in each block that are Mo deficient.

Soil pH

Soil pH is an index of soil reaction that indicates whether or not there is any alkalinity or sodicity problem in a soil. While pH range of 6.5 to 8.5 is considered normal, soil having pH of more than 8.5 is considered alkaline. In such soils (alkaline) exchange complex gets dominated with exchangeable sodium resulting in nutritional imbalances. Soil physical properties also get deteriorated. Such soils need special attention and can be reclaimed by adding soluble source of Ca as soil amendment.

Data in Table 18 depicts range (Minimum and Maximum) and Mean of soil pH and Table 19 gives percentage of soil samples

Table R: Range and mean of soil pH in soils of different blocks of the project area:

Block	Soil pH		
	Minimum	Maximum	Mean
District Gulbarga			
Afzalpur	7.8	9.3	8.7
Aland	6.5	9.0	8.2
Chitapur	6.8	9.0	8.4
District Bidar			
Bhalki	7.1	8.7	8.3
Basavkalyan	6.2	8.5	7.3
District Raichur			
Raichur	7.33	8.9	8.3

Table S: Number of soil samples (%) in different categories of soil reaction (pH)

Block	Availability Class	
	Normal (<8.5)	Alkaline (>8.5)
District Gulbarga		
Afzalpur	20.3	79.7
Aland	66.2	33.8
Chitapur	64.3	35.7
District Bidar		
Bhalki	98.4	1.6
Basavkalyan	100	0
District Raichur		
Raichur	73.1	26.9

Based on average pH values soils are mostly normal in soil reaction. However all the three blocks in Gulbarga district and Raichur block exhibits problem of marginal alkalinity in some pockets. There was no such problem in district Bidar where almost all soils were normal in soil reaction. This may be due to high rainfall in district Bidar.

Electrical conductivity (EC)

Electrical conductivity is a measure of salt content (soil salinity) in soil. Soil EC of more than 1.0 dS/m in 1:2 soil water suspension is considered harmful for the crop growth as it gives additional stress towards nutrient and water availability. Soil EC less than 1.0 dS/m is considered non-saline.

Data in Table 20 depicts range (Minimum and Maximum) and Mean of soil pH and Table 21 gives percentage of soil samples in different categories of soil salinity.

Table T: Range and mean of soil salinity (EC2) in soils of different blocks of the project area

Block	Soil EC (dS/m)		
	Minimum	Maximum	Mean
District Gulbarga			
Afzalpur	0.07	0.87	0.17
Aland	0.05	0.29	0.11
Chitapur	0.07	0.19	0.12
District Bidar			
Bhalki	0.07	0.32	0.15
Basavkalyan	0.03	0.18	0.09
District Raichur			
Raichur	0.05	0.44	0.15

Table U: Number of soil samples (%) in different categories of soil salinity (EC2)

Block	Availability Class	
	Non Salinel (<1.0 dS/m)	Saline (>1.0 dS/m)
District Gulbarga		
Afzalpur	100	0
Aland	100	0
Chitapur	100	0
District Bidar		
Bhalki	100	0
Basavkalyan	100	0
District Raichur		
Raichur	100	0

EC in all soil samples ranged from 0.03 – 0.87 dS/m and none of the soils had any soil salinity problem.

Annexure 2:

Matka Pesticide Details



Calotropis gigantean



Butter milk



Custard apple



Neem leaves

Method of Making Matka Pesticide:

Equal quantities of ingredients need to be mixed with 10 liters of butter milk as base and the mixture needs to be left for 20 days. After the right chemical reactions, the organic pesticide is ready. 100 ml of the ready mix is sufficient to mix in 10 liters of water and can be used for foliar spray.

Annexure 3:

Sl.No.	Place	Village	Taluka	District	
1	AVRC centre	Gudur	Afzalpur	Gulbarga	
2	AVRC centre	Anklaga	Afzalpur	Gulbarga	
3	AVRC centre	Hebbal	Chittapur	Gulbarga	
4	AVRC centre	Tadkal	Aland	Gulbarga	
5	AVRC centre	Halabarga	Bhalki	Bidar	
6	AVRC centre	Sastapur	Basvaakalyan	Bidar	
7	FPO location	Gonal	Raichur	Raichur	
8	CHSC centre	Hulsoor	Basavakalyan	Bidar	
9	CHSC centre	Janwada	Bidar	Bidar	
10	CHSC centre	Bagdal	Bidar	Bidar	
11	CHSC centre	Hallikhed	Humnabad	Bidar	
12	CHSC centre	Halbarga	Bhalki	Bidar	
13	CHSC centre	Atnoor	Afzalpur	Gulbarga	
14	CHSC centre	Khajuri	Aland	Gulbarga	
15	CHSC centre	Gundagurthi	Chittapur	Gulbarga	
16	CHSC centre	Aurad (B)	Kalaburgi	Gulbarga	
17	CHSC centre	Kamalnagar	Aurad	Bidar	
18	KVK Kalaburgi	Kalaburgi	Kalaburgi	Gulbarga	
19	KVK Bidar	Bidar	Bidar	Bidar	
20	KVK Raddewadgi	Raddewadgi	Jewargi	Gulbarga	
21	SADH office	Humnabad	Humnabad	Bidar	
22	SADH office	Raichur	Raichur	Raichur	
23	SADH office	Aland	Aland	Gulbarga	
24	Nandi Fertilizer	Munhalli	Kalaburgi	Gulbarga	
25	Fertilizer Shop	Chowdapur	Afzalpur	Gulbarga	
26	Kissan Fresh	Kalaburgi	Kalaburgi	Gulbarga	
27	Department of Agriculture	Kalaburgi	Kalaburgi	Gulbarga	
28	Department of Agriculture	Bidar	Bidar	Bidar	
29	Department of Agriculture	Raichur	Raichur	Raichur	
30	Gram Panchayat	Hebbal	Chittapur	Gulbarga	
31	Gram Panchayat	Nilogal	Lingasugur (1)	Raichur	
32	Gram Panchayat	Gobbur	Devdurga	Raichur	
33	KVK Raichur	Raichur	Raichur	Raichur	
34	Gram Panchayat	Belamgi	Aland	Gulbarga	
35	Gram Panchayat	Jegarkal	Raichur	Raichur	
36	Kalaburgi Office	Kalaburgi	Kalaburgi	Gulbarga	



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