

# **Success Stories**

## Innovative Young Vegetable Farmer: An example of ARYA (Attracting and Retaining Youth in Agriculture)



**Sri. Krishnaiah, S.A.**

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Sri. Krishnaiah, aged 25 is from the village Sangapura Gollarahatti in Tumakuru district of Karnataka. He used to sell butter in Bengaluru city for his livelihood after the completion of Pre University Course. He used to earn around Rs.3000 per month in this way. He has a landholding of 5 acres with irrigated, rainfed and agro-forestry areas in his village. He was selected by SMS Agril. Extension from KVK Hirehalli for ARYA concept during 2009. Today, he is a vegetable farmer, growing vegetables like french beans, tomato, peas, radish, brinjal, chilli and green leafy vegetables for the last four years. Earlier, he used to grow field crops like *ragi*, *jowar* and mustard, but the income was not satisfactory. He is now growing Arka Suvidha, Arka Komal & Arka Anoop, improved french beans varieties of Indian Institute of Horticultural Research (IIHR), Bengaluru

The yield of French beans ranged from 14.5 –16.5 t/ha, which is the highest among nearby villages. Arka Suvidha variety fetched more price in market as it is a stringless variety. Whenever labour problem arises, harvesting can be done even after a gap of 5 days, as the beans of this variety do not lose its quality. Yield wise Arka Anoop is found to be the best. He could get 16.2 t/ha, and the variety is also resistant to important diseases like rust and bacterial blight. He got a market price of about Rs.14/kg for Arka Suvidha compared to Arka Anoop and Arka Komal (where he fetched Rs.12/kg). He now prefers to grow Arka Anoop and Arka Suvidha because of their additional qualities and high yield. According to Sri. Krishnaiah, Arka Anoop and Arka Suvidha are having good cooking quality. Arka Suvidha fetches higher price in the market because of its preference by working women.

Earlier, Sri. Krishnaiah, as a small time farmer used to bring his vegetables for sale to important markets of Bengaluru. Once he started growing in large scale, neighboring vegetable vendors came to know about his produce and quality of the vegetables. Hence, the vendors come to his place and purchase the produce at attractive prices.



The seeds of improved varieties were provided for demonstrations by the KVK (IIHR) during the year 2010. After knowing the performance of these varieties, Sri. Krishnaiah visited and interacted with scientists of KVK and procured the seeds. He started growing improved varieties from 2010 onwards and he is now realizing higher yields. Sri. Krishnaiah is constantly in touch with Subject Matter Specialist (Agril. Extension) and as a follow up, the SMS and other KVK staff visit his field regularly. He has been provided with all the need based knowledge and skill, which included enrichment of fertilizer, pest management etc.

During his visit to KVK, he came to know about the vegetable special for the tomato, beans and other vegetables. The recommended dosage of vegetable special for tomato is 75 grams in 15 litres of water along with 1 shampoo sachet and 2 medium sized lemons. For french beans, it is 2 grams per litre. He is now using vegetable special regularly as he has noticed that the fruit quality and diseases resistance of the crops have improved. It also helps in retaining more number of flowers, thus increase in the fruit set, leading to higher yield.


Similarly, as an intercrop in areca nut, he is growing *ellaki* banana with the technical guidance from KVK Scientists. He follows techniques like banana bunch feeding technology, use of fruit fly traps in mango, use of bio-fertilizers for enrichment of soil. He started using both bio-fertilizer (Phosphate Solubilizing Bacteria (PSB), Azospirillum and Azotobacter) and bio-pesticides (*Pseudomonas fluoresces*, *Paecilomyces lilacinus* & *Pochonia chlamydospria*). He has also started growing other improved varieties like, Arka Anand (a hybrid green long Brinjal from IIHR, resistant to bacterial wilt) and chillies (Arka Meghana and Arka Shwetha).



He has been recognized by All India Radio, Mysore and an article on his success was published by NABARD in collaboration with AIR, Mysore. He participated in the “National Business Meet on Plant Protection in Protected Cultivation of Vegetables and Flowers” organized by IIHR, and Society for Promotion of Horticulture, Bengaluru during March 06-07, 2014 had gained knowledge in the concerned subject. He also participated in the Vocational Training programme - Coconut Friends and received second prize in Coconut Olympics.

The key to his success seems to be his eagerness to learn and understand quickly, hard work and positive attitude. He is now a model vegetable farmer for the region.

## Strategies for success – A lesson from a Mango Farmer

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Sri. Revannasiddaiah, S/o Huchegowda, aged 67, is a Mango farmer from Neralapura village, Tumakuru District, Karnataka. Both husband and wife, studied up to S.S.L.C, are living in the village looking after their three acres mango orchard, while both the sons, educated are settled in Tumakuru and Hosakote. In the initial years, the farmer was in search of a suitable intervention for his three acres dry land farm. During 2003 he came into contact with Dr. B.M.C. Reddy, the then Director of Indian Institute of Horticultural Research (IIHR), Bengaluru. Based on his advice to go for Mango as a dryland horticulture intervention, he planted 74 grafted seedlings of Alphonso variety, initially in two acres of his land, in July 2004. Later in the year 2011, he purchased one more acre of adjacent land and continued mango cultivation in that land as well. Till 2009 he had contact with IIHR, Bengaluru and from 2010 onwards he came to know about the Krishi Vigyan Kendra (KVK), Hirehalli (under IIHR) at Tumakuru.

Dr. Reddy's package of practices (PoP) includes application of 60 kg of FYM, every year as a blanket application and 5 kg of oil cake mixtures (neem, pongamia, groundnut etc) at the root zone. In the additional one acre farm he applies 20 kg of FYM and half kg of oil cake mixture every year. He applies water using a water tanker only during the non-rainy period – November to May (7 months). About 40 litres of water is being applied to each tree once in 10 days.

In the year 2010 onwards, the KVK, Hirehalli helped him with some of the technological interventions, viz., Mucuna (Velvet bean) as an intercrop for green manure (On Farm Trial), Micro Nutrients Foliar Spray (Mango special) for uniform mango size and increase in yield and use of Pheromone trap for monitoring Mango Fruit Flies (Front Line Demonstration). He was advised to apply Mango Special (75g of Mango Special Powder + 2 medium size Lemons + One sachet shampoo in 15 litres of water) to his entire orchard on monthly interval. He installed about 12 fruit fly traps in his 2 acres.

In the year 2010, from the first bearing, he got a yield of 480 Kgs. That was when a contractor approached him for a rate contract. The contractor asked for Rs.8000 for the whole orchard. But, the farmer thought otherwise and decided to sell the mangoes on his own. He came into contact with Dr. Rajendra Keni, General Physician at Sadashivanagar, a posh locality in Bengaluru city. The Doctor was aware of the quality of his mangoes, which were ripened on traditional method using paddy straw, free from calcium carbide, safe for health. Initially the farmer sold mangoes at prevailing market price. Once customers tasted

Nelarapura Mangoes from the orchard of Sri. Revannasiddiah, they came back asking for same quality mangoes because they were free from fruit flies and were naturally ripened and tasty. Customers themselves offered premium prices for the quality produce. So, the farmer found a good market and started selling them directly to the Doctor's family members and friends. The Doctor, in turn started prescribing these quality mangoes to his clients and other friends. Thus, Sri. Revannasiddiah decided to sell the mangoes regularly to these customers, who were ready to pay premium prices. That year finally he got a gross return of Rs.40,000, five times more than what the contractor had asked for! The customers keep in touch with the farmer for quality mangoes every year.

During 2011, the yield was 2400 kg. This time 1020 kg of graded fruits were packed and sold @ Rs 500 per box (of 6 kg). The remaining 1380 kg were sold to a contractor for Rs.25,000 at farm price. Whereas, the farmer sold graded mangoes for a whopping amount of Rs.85,000! The yield also started increasing every year but price is kept at Rs.500 per box till 2013.

Table 1: Increase in income through direct marketing

Income through contractor			Income through direct marketing			Percentage increase in gross income
Production (kg)	Income (Rs.)	Average gross income per kg (Rs.)	Production (kg)	Income (Rs.)	Average gross income per kg (Rs.)	
1380	25000	18	1020	85000	83	361

In the year 2014, the bearing was comparatively less than the previous years and prices were also crashed due to some market related reasons. But, still he managed to sell them off for Rs.1,20,000. KVK has introduced Low Cost Mango Ripening Chamber to him. It is a small one cubic meter structure made of plastic pipes and polythene sheets. Mangoes (about 8 crates -1250 fruits) used to be kept in the chamber for 24 hours. In one cubic meter structure only 75 per cent of space for fruit was occupied. Inside the chamber, Ethylene solution (2%) and Sodium hydroxide (0.5 gms) were mixed and kept in a bowl. The controlled fumigation technique helped him to speed up the ripening process, whereas the dangers of using calcium carbide were completely avoided. In traditional ripening method, it used to take 10 days for ripening and change in colour. But using this low cost ripening technology, fruits are taken outside the chamber after 24 hours, and within 5 days they attain uniform colour. After keeping the mangoes for the specified period, he used to remove and pack them in used carton boxes. He sold 200 such boxes, each 6 kg of mangoes (in total 1200 kgs). On an average he sold them for Rs.100 per kg, which was much higher than the prevailing rate for Alphonso variety at that time. For transport to Bengaluru, all he invested was Rs.1400 per trip and in each trip he carried about 100 boxes. Thus the farmer made a fortune by producing and selling his mangoes by using simple technologies suggested by IIHR and KVK. His interview on Low Cost Mango Ripening Chamber Technology was telecasted in Doordarshan – Chandana channel on 12<sup>th</sup> & 13<sup>th</sup> of June 2014.

Sri. Revannasiddiah earned about two lakhs rupees in a short period of time by following the methodologies suggested by KVK (IIHR) for production and post-harvest care

of mangoes. Recently, he purchased a TVS Moped from this income. Now, he also motivates several other neighboring farmers to adopt the scientific cultivation and processing methods offered by the KVK.



## Innovative Vegetable Women Farmer – a Success Story through adoption of new Technologies



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Smt. Shashikala is an innovative vegetable farmer from Pemmanahalli village of Udigere Hobli, Tumakuru Taluk and Tumakuru District, Karnataka. She has completed her S.S.L.C. and currently actively involved in the development of agriculture, horticulture and animal husbandry. Smt. Shashikala has got a keen interest in horticulture related activities and has developed good linkages with different public development departments like Indian Institute of Horticultural Research (IIHR), Bengaluru, Krishi Vigyan Kendra (KVK), Hirehalli, Tumakuru, and Karnataka State Horticulture Department (KSHD). She is motivating women farmer members of various self help groups to adopt new technologies of IIHR. She is having a landholding of 4 acres out of which 1.5 acres is irrigated.

She is the member of a Sri Vinayaka Shree Shakthi - Self Help Group (SHG) which is having 20 members. The group meets once in every 15 days. The SHG group activity includes agriculture and horticulture planning, organic farming, animal husbandry and vermi-composting. She started growing vegetables like french beans, tomato, peas, brinjal, chilli and green leafy vegetables since 2010. Earlier they used to grow field crops like ragi, field bean, red gram and jowar.

Crops and varieties: Smt. Shashikala is growing improved peas variety of IIHR (Arka Ajit) and Magadi local. Arka Ajit variety has been grown in Pemmanahalli at her farm for the last two years. The yield details are given below in Table 1.

**Table. Average 3 season performance of improved and local varieties of peas (2009-12)**

<i>Sl. No.</i>	<i>Varieties</i>	<i>Yield (t/ha)</i>
1.	Arka Ajit*	16.5 t/ha
2.	Magadi Local	17.4 t/ha

\* Arka Ajit is resistance to powdery mildew from which cost on chemical fungicides was reduced to farmer.

Similarly, the yield of french beans, which she has grown for three consequent seasons, ranged from 13.5 – 18.5 t/ha and the productivity is highest among nearby villages. She found Arka Suvidha variety better being stringless variety, fetching more price in the market. Traders found it to be suitable for local and Bengaluru markets. With Arka Anoop, she could get up to 17 t/ha. The variety is resistant to rust. She got a market price of about

Rs.11/kg for Arka Suvidha compared to Arka Anoop and Arka Komal (where she fetched Rs.10/kg). She now prefers to grow Arka Anoop and Arka Suvidha because of their additional qualities and high yield. According to her, Arka Anoop and Arka Suvidha are having good cooking quality as well. Earlier she is used to grow in same land ragi, jowar, field bean and red gram, in which she used to realize an average net returns of Rs. 20,000/- per acre. Now by switching over to short duration vegetable crops she is able to earn a net return of Rs. 60,000/- per acre.

**Interaction with Research Institutes:** She is in constant touch with scientists from IIHR, Bengaluru and KVK, Hirehalli for her technological needs. The seeds of improved varieties were provided for demonstrations by the IIHR since 2006. She has now become an expert in management of french beans production including pest and disease management. Smt. Shashikala being hardworking and innovative farmer, she has been identified as a techno-agent for dissemination of technologies in horticulture to other farmer of the area. Her services are also being used by the KVK to educate other farmers on improved vegetable cultivation.

**Market Integration:** In contrast to her visits to Bengaluru market earlier, now the vendors come to her place and purchase the produces. She has also motivated other farmers in her own and neighboring villages and about 15 farmers are now growing improved varieties of french beans.

**Use of Organic Formulations:** In case of peas and tomato, she is now using '*Panchagavya*', an organic formulation during the flowering stage. She has found it effective in controlling flower drop. *Panchagavya* is made with 5 kg of cow dung, 10 litre of cow urine, 1 litre of curd, 1 litre of milk, 1 kg of ghee. After keeping for 15 days, the solution is diluted with water in 1:10 ratio and sprayed.

**Use of Vegetable Special:** During her visit to IIHR, she came to know about the vegetable special for the tomato, beans other vegetables. The recommended dosages of vegetable special for french beans is 2 g/l. She is now using vegetable special regularly, as she has noticed that the fruit quality, diseases resistance of the crops grown have improved.

**Use of Bio-fertilizer & Bio-pesticides:** She has started using bio-fertilizers like Phosphate Solubilizing Bacteria (PSB), *Azospirillum* & *Azotobacter* for enriching the farm yard manure. She is also using bio-pesticides (*Pseudomonas fluoresces*, *Paecilomyces lilacinus* & *Pochonia chlamydospria*) for bio-controlling of pest and diseases.

**Innovativeness:** Smt. Shashikala, through her continuous training and interaction with scientists, is able to identify the insect pests of french beans, including stem fly, and is better in their management practices. After seeing the potential of the new variety, she has taken up seed production in the current year. The seeds so generated were supplied to the neighboring farmers. With her intervention they have started to grow different vegetable crops in a season in the village and as a result they are realizing better price in the market. She is convinced about the group approach in popularizing technologies among the farmers of her village. She has organized numerous group meetings with help of scientists from IIHR and KVK, Hirehalli. The meeting on topic like seed production in french bean, Integrated pest and




disease management were organized, in which 12-15 groups of farmers participated. The idea was to have good exchange of ideas, discussing pros and cons of technologies etc. She is convinced of bringing agricultural and horticultural development in the village through group approach. By realizing the importance of growing vegetable crops she is diversifying to other horticultural crops like tomato, chilli, leafy vegetables and banana. In all these crops she is following the recommended practices of IIHR, by interacting with the KVK scientists, and Division of Extension and Training.



New varieties: She has started growing other improved varieties and hybrids like Arka Anand (a hybrid green long Brinjal from IIHR, resistant to bacterial wilt), Chilli (Arka Meghana and Arka Shwetha), Amaranthus (Arka Suguna) and Palak (Arka Anupama). She is preserving seeds of Magadi local peas at Pemanahalli since 40 years and earning good remuneration by selling seeds and pods. Her success story on cultivation of Magadi local peas was documented in DD Chandana and Adoption of IIHR technology for self sustainable in agriculture. She is also the recipient of Young Farm Women award at UAS, Bengaluru during International Krishi Mela 2013. During November 2014 she was identified under young farm women category by UAS, Bangalore and selected for Farmer Exposure Visit - All India Tour sponsored by Govt. of Karnataka. By this she gained knowledge in different agriculture and horticulture practices. Now she is a Champion farmer for KVK Hirehalli. The key to her success lies in her eagerness to learn and grasp new technologies quickly and adopt them immediately in her field, a prime quality of an innovator.

## High density planting in Banana: A boost to farmer's profit

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India is the largest producer and consumer of banana in the world. In Tumakuru district of Karnataka, among the major fruit crops, banana shows a steady increase in area after mango. The latest statistic data shows an area of 4,904 ha under banana in the district. Its varied and wider adoptability under different farming situation make it small farmers' favorite crop. The irrigation system and farm holdings also make banana a practical alternative crop.

Grand naine (G-9) variety of banana is a popular one among farmers, because of its relatively good shelf life and an attractive golden yellow colour at the time of maturity and is internationally well acceptable. More that 40 % of banana cultivation is as intercrop in areca nut and coconut gardens in Tumakuru district, since in conventional method of planting system productivity is very low due to the low plant population, resulting in minimum income from unit area.

However, most of the farmers consider banana as a risky crop for the small land holders. So, many institutes have released different technologies for minimizing the risk in banana cultivation. High density planting with paired row is one such technology developed by ICAR-National Research Centre on Banana (NRCB), Thiruchirapalli, Tamil Nadu. This technology helps the farmer to earn higher profits from the limited land resources.

In this connection, KVK Hirehalli has implemented a Front Line Demonstration (FLD) on high density planting of banana with paired row method in the field of Sri. Mayaganna of Mulakunte village of Tumakuru taluk. He is a banana farmer specialized in the cultivation of G-9 variety. His average annual income from banana farming was Rs.1.47 lakhs /ha. During year 2013-14, KVK Hirehalli selected him as beneficiary farmer for the FLD, to study the suitability of high density planting in banana, a NRCB technology.

The SMS (Horticulture) trained him on the technology and the farmer planted the banana at a spacing of 1.5 x 1.5 x 2.0 mt in paired row with zig zag method of planting, in contrast to the conventional planting method of 2 x 2 mt. In the high density method he could plant 5200 plants per hectare in place of 2500 per hectare in the conventional method. Before start of the demonstration he believed that close spacing will reduce the overall yield.

The average bunch weight in his method of planting was 20.5 kg leading to a productivity of 578 qt/ha whereas he got an average bunch weight of 17.2 kg in high density planting leading to a productivity of 760 qt /ha. This increased his income level to INR 3.82 lakhs / ha per annum with a B: C ratio 3.54.

**Table on the above figures – comparing conventional and HDP in banana**

Sl. No.	Spacing (M)	Yield	Net Returns (Rs./acre)	B: C ratio
1.	Paired row with Zig zag- 1.5 x 1.5 x 2.0	760 qt/ha	3,82,000/-	3.54
2.	Conventional method - 2 x 2	578 qt/ha	2,54,600/-	2.69

Now Sri. Mayaganna is growing high density planting in banana with different varieties viz., *yelakki bale*, *nanjanagudu rasbale*, *puttabale* etc., and earning more profit. High density planting helps the plants to utilize water and fertilizer more efficiently through increase root density. It helps the plant to resist winds more effectively and thus cost for staking was also considerably reduced, he says. Now, seeing the success of Sri. Mayaganna, other farmers of the demonstrated area also want to cultivate banana in this method. Farmers from other villages are continuously visiting and contacting KVK for technical guidance.




HDP in Grand Naine variety



HDP in Yelakki Bale variety

## Increased Productivity of Banana Through foliar Application of Banana Special

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Banana is second most important fruit crop of the district, next only to mango, and is grown mainly under irrigation. The Banana Grand-9 is demonstrated at KVK, Hirehalli farm in 0.5 ha. The planting is done in the month of July. The availability of micronutrients is low in Tumakuru area due to coarse textured soil, low organic matter and high pH of soil. These result in predominant micronutrient disorders. To overcome these problems and to get higher productivity, Banana Special (an IIHR technology) was recommended by KVK, Hirehalli at the rate of 5 sprays @ 5 g/lit at 30 days interval starting from 5th month from the planting.

Sri. Jayaram is small farmer from Sannappanpalaya, Hirehalli Post, Tumakuru, growing banana in his 0.5 ha area. On observing the results in KVK farm he was motivated to apply the same technology in his field as well. The demonstration was conducted at his field in 0.5 ha. The results have clearly indicated that by adoption of the Banana Special foliar application, the yield of the crop could be increased to an extent of 17.46 % on an average. The farmer got benefitted with additional yield of 5.5 t/ha compared to local and an additional income of Rs. 27500.

Table 1. Increase in yield using banana special

Area (ha)	Yield (t/ha)		Percentage increase
	Check	Banana Special Treated Plants	
0.5	31.5	37	17.46

The demonstration of this technology have been widely publicised through different mass media like news paper, radio and TV and widely used in the farmers training programme of the KVK. Dissemination efforts made by this KVK with the proven results, the farmers of the district under irrigated agro-ecosystem are adopting this technology with horizontal spread to a greater extent area (1597 ha) in Tumakuru.



**Friends of Coconut Tree - A boon to the farmers of Tumkur district and succeed in giving professional coconut tree climbers**



**Mr.Gopal Gowda,**  
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Coconut Palm is an important cash crop in the Tumkur district and it is being cultivated in an area of about 1, 32,587 ha with a production of 20,912 lakh nuts. Coconut cultivation and allied activities provided livelihood security to the many farmers of Tumkur district. For harvesting the nuts, removing the dried fronds and for spraying and applying insecticides on the crown, it requires skilled labourers to climb manually up the tree. Skilled and trained coconut tree climbers have become scarce and farmers are finding it difficult to harvest the nuts timely.

The traditional method of coconut climbing is cumbersome, risky and less effective, because of high energy consuming process. The younger generations are not showing interest to engage them in this activity. The aged people alone are doing traditional harvest. Often these aged people fall from coconut palms leading to permanent handicap even death occurs. In traditional methods farmers are harvesting an average of 30-40 palms per day. The labourers harvesting the coconut in traditional way are demanding Rs.20 to 30 per tree and they are attending harvesting on an average of 2-3 months interval. This has led to yield reduction due to improper maintenance of coconut palms and loss by theft of fallen coconuts.

In this connection, Krishi Vigyan Kendra, Hirehalli conducted various trainings and demonstrations for a period of 6 days which was sponsored by the Coconut Development Board, Hulimavu, Bengaluru and introduced the mechanical coconut harvesting machine for rural youth of the district to create awareness and regular practicing of climbing by master trainers. Besides coconut climbing, they were trained on all aspects of coconut cultivation like seed nut selection and procurement, safe handling of seed nuts and tender nuts, coconut nursery and its management, planting and aftercare, tender and mature nut identification, identification of pest and disease of coconut and their management etc. A total of four trainings and demonstrations were conducted. A total number of 80 rural youths were participated in the programmes from the district. The best part of the 'coconut-climber' is that even non-professional climbers can operate it, making it a boon for farmers.

**Successful outcome:**


Sri Gopal Gowda, is unemployed residing at K. Bevenahalli ,Turuvakere taluk Tumkur district attended the Friends of Coconut training programme at KVK Hirehalli. Soon after he completed the training programme successfully, he started coconut plucking as his

career and goes to work on his own two wheeler along with the coconut climbing machine received during the training programme. Sri. Gopal Gowda climbs the palms for coconut harvesting and he also cleans the crown of the coconut palms, farmers engaging him are more satisfied. He also provides the information on Pest and disease management and fertilizer aspects for palms. On an average he climbs nearly 70 to 90 palms per day and approximately 750 palms per month. He is charging Rs.20-25 /tree depending on the total number of coconut trees available and also based on the height of the tree. He is having cell phone and communicating the programme to the customer in advance in the district and other adjacent districts also. He is earning Rs 1500-2000/day and the total revenue was Rs. 15,000 per month and leading a happy life. The labour scarcity for harvest of coconuts thereby is in a declining trend in the taluk.

<b>Name &amp; address of CTC</b>	<b>No of palms climbing /day</b>	<b>Price /tree (Rs.)</b>	<b>Approx. No of palms climbing/month</b>	<b>Total Revenue / Month (Rs.)</b>
Sri. Gopal Gowda K. Bevenahalli , Turuvakere, Tumakuru M :7259724723	70 trees	20	750 palms	15,000



## Rain Water Harvesting – A pathway to livelihood security

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Sri.Venkatappa is a marginal farmer of D.Nagenahalli village in Koratagere taluk of Tumakuru district. He is one of the farmers in D.Nagenahalli village who participated in the TDC-NICRA (Technology Demonstration Component - National Initiative on Climate Resilient Agriculture) Project of KVK, Hirehalli. He has 1.75 acre of land (of slightly slope with poor fertile soil). Before intervention, he used to grow one or two crops like Paddy (0.50 acre) and Groundnut (1 acre) or Ragi only during the monsoon in 1.5 acres, leaving 0.25 acre as fallow. Paddy was tried by him, and many of the other farmers in this village, because of the seepage water from upstream and consequent water logging condition. Because of this, he could not take any other crops. The farm income used to be less due to uneven rainfall and restricted crop choice.



The NICRA team from KVK, Hirehalli met him and discussed about the interventions. Gradually suitable interventions were introduced. The land was leveled and made compartments to reduce the soil erosion. A farm pond of dimension 10m x 10m x 2m with water storage capacity of 200 cu m was dugout to harvest the runoff in the year 2011. He started cultivating about three crops per year with the help of farm pond. Later, he brought the remaining 0.25 acre also under cultivation. He tried vegetables and aster flower along with his earlier crops in his farm after the intervention, which was typical example of diversification at farm level. The sole dependency on groundnut during monsoon and paddy in the water logged area was replaced with the diversified cropping system, which is found to be very important as far as livelihood security is concerned. During these years even though monsoon was not good, he still managed to get sufficient yield with the harvest of whatever rain water precipitated. It was possible only due to his 200 cu.m farm pond. However, he used the collected water for irrigation at the critical stages. Given below are the details of additional

yield and income gained by the farmer during 2011-12 to 2013-14 due to the additional water supply from the farm pond and the additional crops possible by the interventions.


Table 1. Impact of farm pond on income of the farmer

<b>Crop</b>	<b>Variety</b>	<b>Area (Acre)</b>	<b>Yield</b>	<b>Gross Cost (Rs.)</b>	<b>Gross Return (Rs.)</b>	<b>Net Return (Rs.)</b>
<b>2010-11 (Before NICRA)</b>						
Paddy	Local	0.5	7 q	6150	9570	3420
Ground nut	Local	1.0	5.7 q	4492	14872	10380
			<b>Total</b>	<b>10642</b>	<b>24442</b>	<b>13800</b>
<b>2011-12 (After NICRA)</b>						
Paddy	Local	0.75	14 q	9100	14400	5300
Tomato	Lakshmi	0.25	7 ton	13700	41700	28000
Chilly	Local	0.25	1.5 q	5500	25500	20000
Coriander	Local	0.25	8 q	2500	18500	16000
			<b>Total</b>	<b>30800</b>	<b>111130</b>	<b>69300</b>
<b>2012-13</b>						
Paddy	Local	0.75	16 q	9500	15500	6000
Aster	Local	0.5	14 q	4500	17900	13400
Tomato	Local	0.5	5 ton	10500	21500	11000
			<b>Total</b>	<b>29500</b>	<b>54900</b>	<b>30400</b>
<b>2013-14</b>						
Paddy	Local	0.75	18 q	10500	19500	9000
Aster	Local	0.5	16 q	6000	20500	14500
Tomato	Lakshmi	0.5	6 ton	12500	37500	25000
			<b>Total</b>	<b>29000</b>	<b>77500</b>	<b>48500</b>

His income increased more than double in these years as shown in the table. The BC ratio was 1:2.3 before the intervention. But it improved to 1:3.6 and 1:2.7 in the years 2011-12 and 2013-14, except for the year 2012-13 (1:1.9)



## Addressing Drought Vulnerability by Cultivation of Aerobic Paddy (MAS-26)

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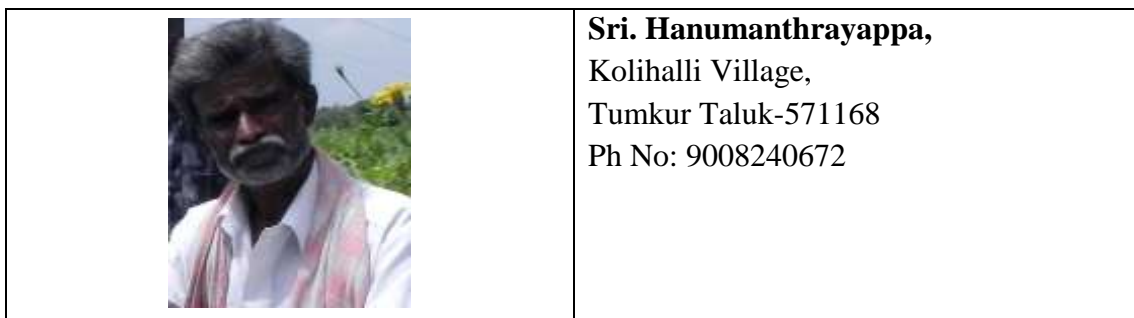
Rice (*Oryza sativa* L.) is the most important cereal crop of India. In Karnataka, about 55–60 % of the rice is grown under puddled system and the rest is under a rainfed situation. Traditional rice cultivation method is well- suited to countries and regions with low labour cost and high rainfall, as it is very labour-intensive. Irrigated rice is typically transplanted into puddled paddy fields, which includes land preparation with 4-6 inches of standing water and this method of cultivation requires large quantities of water. Because of increasing water scarcity, Aerobic Paddy cultivation is getting popular in the country, apart from SRI method. Considering the drought prone nature of D.Naganahalli, the village selected under TDC-NICRA project of KVK, it was decided to demonstrate this method in the NICRA village.

The main advantages of the drought tolerant aerobic paddy MAS 26 are - direct sowing, no need for puddling, resistance to pests and diseases, reduction in pollution, medium duration, possibility of about 60 tillers on an average per seed and 50% water saving along with 80% seed saving.

The demonstration of aerobic paddy MAS-26 was conducted at farmer field Sri Mahesh.N.M, in 0.5 ha. Sri. Mahesh is a medium farmer. He studied diploma in Electricals. The performance of the aerobic paddy MAS-26 (37.5 q/ha) was found to be superior to the local variety of paddy (29.8 q/ha). The yield of MAS-26 increased to an extent 12.4 %. The farmer got benefitted with additional yield of 2q/ha compared to local and an additional income of Rs. 3,600.



**Biointensive Management of Egg Plant Shoot and Fruit Borer by  
Hanumanthrayappa, Kolihalli Village of Tumkur Taluk.**



Mr.Hanumanthrayappa, Kolihalli Village of Tumkur Taluk is having 5.5 acres of land. Out of which, he is growing 3 acres of vegetables like Brinjal, Tomato, Bhendi etc. His yearly income was Rs.1.75 lakhs. He grows Brinjal crop regularly in 1.0 acre of land particularly in two seasons. Unfortunately, He fetches severe yield loss mainly due to incidence of shoot and fruit borer (*Leucinodes orbonalis* Guen.). The pest causes extensive yield loss up to an extent of 38 per cent. Despite serious nature of the pest, its management tactics by and large is limited to frequent sprays of chemical insecticide resulting in high cost of cultivation(Rs.37450/ha) and less control due pest resurgence.

Under above circumstance, KVK, Hirehalli has helped him adapt a new technology developed by IHR, Bangalore through front line demonstration during Kharif, 2013-14 i.e Biointensive management of Brinjal shoot and fruit borer viz., Erection of pheromone trap @ 1 for 400 sq.mts. (Lure changed once in 21 days), Release of *T. chilonis* @ 50,000/ha and Bt spray at peak flowering @ 1ml/L(two times). It was revealed that average shoot infestation was very low (4.89 %) compared to Check plot (28.90 %). The average fruit infestation of 12.65 per cent was recorded in demon. plot, where as check plot recorded the highest fruit infestation (33.65 %). The percent increase in marketable fruit yield(58.52 %) was higher in demon. plot over check with B.C ratio of 4.27. The net Returns was Rs.170160 compared to earlier returns of Rs.69890.

Mr.Hanumanthrayappa was very well convinced the above technology and spread the technology to the entire village as an ambassador of KVK, Hirehalli. Now, nine farmers are practised the same technology covering 5ha in Kolihalli village



## **Multiple cropping with poly mulch and drip irrigation – A story worth to emulate**



Smt.Saroja is a progressive women farmer from Devarayapatna village of Tumkauru district, Karnataka. She has graduated from Tumakauru and now grows vegetables and flowers in an area of 2 acres along with her husband. KVK, Hirehalli has introduced improved varieties of vegetables and flowers to her in the year 2013-14, in which she showed tremendous outcome.

The story started with the introduction of improved tomato variety – Arka Samrat under plastic mulching in her field. Tomato is an important commercial vegetable crop in India. Tomato farmers are facing problems due to the climate change which leads to outbreak of pest and diseases, drought situation, bore wells going dry, labour scarcity etc. In last 3-4 years major diseases like late blight and leaf curl have emerged as devastating problems for tomato crop. Subsequently cost of cultivation has also gone up and labour shortage has a major threat for farming community. Farmers are finding it difficult to cope up with the raised input costs and other related problems. Smt.Saroja is also not an exception from these predicaments.

To mitigate these problems, KVK (IIHR), Hirehalli initiated a demonstration of the technology - Poly mulching with drip irrigation in tomato crop under Front Line Demonstration (FLD) during the year 2013-14 in her field. Earlier, she used to grow only ragi and paddy crops during the monsoon. She was unable to cultivate the profit oriented crops due to the lack of technical knowhow and labour scarcity. She visited KVK, Hirehalli and discussed with scientists about cultivation of tomato. She was advised about the improved tomato production technology developed by IIHR Bengaluru with Hybrid Arka Samrat under poly mulching.

Keeping these suggestions in view, Smt. Saroja decided to go for summer tomato cultivation in her field. She planned for one acre and used the Hybrid Arka Samrat. She transplanted the tomato seedlings on raised beds with ploy mulch film laid with drip irrigation. She has followed

package of practices with fertigation and plant protection recommendations as per the suggestions given by the SMS (Horticulture). She used to visit KVK, Hirehalli frequently for suggestions and regular visits were also made by the KVK Scientists to the FLD plot. The practice of mulching helped in moisture conservation, weed suppression and maintenance of soil structure. Mulches also improved the use efficiency of applied fertilizer and use of reflective mulches minimized the incidences of pests and viral diseases. She started harvesting tomato after 65 days after planting and got 32.50 tonnes of tomato per acre and sold them @ Rs.10 per kg. This resulted in a total income of Rs. 3.25 lakhs per acre. The total cost of cultivation for tomato was Rs.60,000 per acre. Thus, she earned a net profit of Rs. 2.65 lakh per acre (BC ratio 5.41). Farmers of surrounding villages were very impressed by the result of this technological intervention of plastic mulching with drip irrigation. Farmers from the village are of the opinion that by following these technologies, they can reduce the wastage of water and fertilizers and also increase the water use efficiency. The incidence of pests and diseases has come down. The number of seedlings required for planting one acre is also less because of the decreased seedling mortality. The fruits obtained are of better quality and colour, which fetched her more prices in the market.

The anticipated increase in income by using poly mulch in crops, especially of high value such as tomato, appropriately justifies the costs of plastic mulch and drip irrigation. However, use of plastic mulch may or may not impact the net profit in case of low value crops, considering the investment in mulching.

To reap more benefits from the investment made on mulch and drip irrigation, multiple cropping (growing a second or even third crop immediately after the previous crop) has become a common practice under plastic mulching. Rotation of *Solanaceous* crops with a leguminous crop could be a better option in this case. However, proper installation of a good quality plastic mulch and drip tube is absolutely necessary for successful multiple cropping. So, Smt. Saroja was suggested by the KVK to take up second crop as a french beans. She had harvested french bean after 55 days after sowing and gained 3.5 t/acre. She sold them at the rate of Rs.22/kg. The gross income was Rs.77, 000 consecutively, considering the quality of the mulch and drip tubes, she was suggested to go for a third crop – newly released variety of Marigold Arka Bangara from IIHR, propagated through cuttings, in the same polymulch with same spacing. In Marigold, 45

days after planting, she got 1800 kg and sold at the rate of Rs. 20/kg and gross income was Rs. 36,000. By this she earned a total net income of Rs. 0.92 lakh per acre.

Table – showing the income from all the three crops and in total

Sl. No.	Varieties	Yield	Net Returns (Rs./acre)
1.	Tomato Arka Samrat	32.50 t/acre	2,65,000/-
2.	French Bean –Pole beans	3.50 t/ acre	64,500/-
3.	Marigold- Arka Bangara	1800 kg /acre	27,500/-

She received innovative farm woman award from IIHR on her success during the recent ICAR foundation day–18<sup>th</sup> July 2014. Smt.Saroja is acting as a role model for nearby farm women to lead a successful career by following improved horticulture practices.



FLD Plot on Poly Mulching in Tomato – Arka Samrat



I crop - Tomato – Arka Samrat



II crop: French bean crop in same polymulch- Pole beans



III crop: Marigold crop - Arka Bangara



Felicitation to Smt.Saroja, Tomato Grower from Tumakuru during IIHR Foundation day on 18.07.2014

**Contact details:** Smt. Saroja G.C W/o Ramachandraiah D.G.  
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## INTEGRATED DISEASE MANAGEMENT OF BACTERIAL BLIGHT IN POMEGRANATE –WAYS TO DOUBLEING THE FARMERS' INCOME

**Introduction:** Pomegranate (*Punica granatum*), called as “fruit of paradise”, is one of the major fruit crops of tropical and subtropical region of India. The fruit is grown for its attractive, juicy, sweet-acidic and fully luscious grains. The fruits are mainly used for dessert purposes. Being a “vital cash crop”, it is grown in an area of 1.25 lakh hectares with 60.64 lakh tones of production in India and the area under the crop is also increasing very rapidly. Pomegranate occupies sixth place in the fruit export market of India, where it accounts for 50 per cent of the world pomegranate production and earns a foreign exchange to the tune of Rs. 270 crores. In Karnataka, it is grown in an area of 14,000 hectares with the production of 1.5 lakh tonnes and productivity of 10 tonnes per hectare. The most popular varieties suitable for processing and table purposes are Ganesh, Mridula, Arakta, Bhagwa, Kesar, G-137 and Khandar.

**2. Situation and benchmark analysis/Problem statement:** Successful cultivation of Pomegranate in recent years has met with different **traumas** such as pest and diseases. Among diseases bacterial blight caused by *Xanthomonas axonopodis* pv. *punicae* (Vauterin *et al.*, 1995) is a major threat. The survey conducted by National Research Centre on Pomegranate (NRCP) from 2005 to 2009 revealed that prevalence of blight incidence was mild to severe in all pomegranate growing areas of Karnataka and Maharashtra. Prevalence of Bacterial blight in Karnataka was 58.33%, in which 27.77% orchards had moderate blight and 33.05% orchards had mild infections (Anon. 2008, 2009). Yield losses due to Bacterial blight drastically reduced to 10,000 tonnes in the year 2007-08 from 1.18 million tonnes during the year 2003-04, in a span of just four years in Karnataka (Benagi and Ravi Kumar, 2009). In addition to this, cost of cultivation is one of the major concerns nowadays, because of indiscriminate use of pesticides for the control of pests and diseases, excess application of water soluble fertilizers etc. The Data collected in this regard showed that farmers were spending an amount of Rs.2.75 lakhs to 3.10 lakhs per crop compared to actual cost of cultivation of Rs.1.25-1.38 lakhs. Any successful plant protection measure depends on early detection of the disease followed by timely adoption of recommended control measures.

**3. Technology details:** A technology was developed by NRCP, Solapur and ICAR-IIHR, Bengaluru, to address the Bacterial blight of **Pomegranate**. The technology is integrated disease management schedule which include practices like orchard sanitation, avoidance of rainy season crop (*Mrig bahar*) and regulating the *Hasta bahar* crop, judicious sprays of antibiotics like Streptocycline (500 ppm) in combination with fungicides like Carbendazim (0.15%) or Mancozeb (0.2%) or Copper oxychloride (0.3%) or Bordeaux mixture (0.1%) at 15 days intervals based on the prevailing weather conditions recorded in the local meteorological unit. An FLD on Integrated Crop Management (ICM) in Pomegranate by implementing the above technology was conducted for three consecutive years (2014-17) during Rabi season in five farmers' fields of Sira and Pavagada Taluks of Tumakuru district. An extensive awareness cum field visit to every farmer of cluster village helped to reduce the cost of cultivation by avoiding the local quacks that were responsible for wrong advice of pesticides application. Capacity building programmes were conducted at different intervals and at different crop stages to highlight the importance of sprays to be taken up, particularly the dosage and method of chemical application. Further, periodical sprays were taken up depending on the prevailing weather parameters at different intervals and at different crop stages.

**4. Yield and output details:** The yield obtained in demo field was significantly superior over the control field which recorded the least yield of 6.88 t/ha, compared to demo field which recorded an average of 8.92 t/ha. The per cent increase in yield over control was recorded in demo field was 29.65 per cent. The benefit cost ratio recorded was 5.15 in Demo plot compare to check plot (2.15). The significant reduction in cost of cultivation was recorded in demo plot compared to check plot. This is mainly because of drastic reduction in number of sprays and dosage of the unwanted chemicals.



Plot details	Yield Per ha In Qtls	% increase over control	Gross Cost In Rs.	Gross Returns In Rs.	Net Returns In Rs.	B:C ratio
Demo plot	8.92	29.65	1,29,800	6,69,000	5,39,200	5.15
Control plot	6.88		2,39,560	5,16,000	2,76,440	2.15

**5. Income/profit and development:** Successful demonstration of ICM in Pomegranate revealed that there was a drastic reduction in cost of cultivation, which was mainly because of judicious use of pesticides and water soluble fertilizers. KVK was very much **instrumental** in creating the awareness among the farmers by reaching 128 pomegranate growers in Tumakuru District by new extension tools like ICT. Among all, whatsapp played a major role by connecting all the individual farmers. There is a lot of scope to increase the income by value addition and export. A farmer would be getting nearly Rs.130/Kg in international market compared to Domestic market of Rs.75/Kg. The Bio-pesticides and Bio-fertilizers (Arka Microbial Consortium) produced by KVK and used by the farmers helped to reduce the cost of cultivation to a greater extent. KVK is also promoting Farmers producers Organization (FPO) for marketing to avoid local vendors who offer very less price.

**6. Conclusion:** Adoption of advanced recommended package of practices along with use of bio-fertilizers helped the farmers to reduce the cost of cultivation. Doubling Farmers' Income is very much possible in Pomegranate where farmer needs to take judicious decisions at every crop growth stage, keeping in mind the cost of inputs along with consistent liaison with government extension agency.



Demo plots at Pavagada taluk

## Onion Variety: Arka Kalyan – A gain to garner

**1. Situation analysis/Problem statement:** Onion (*Allium cepa* L.) is one of the important commercial vegetable crops grown in India for both domestic consumption and export. In Tumakuru district of Karnataka state, Bellary Red variety of onion is predominantly grown in an area of 650 ha. (Dept of Horticulture, Govt. of Karnataka). But the productivity of the variety is 130 - 140 Qtls/ha, much lower than the state (180 Qtls/ha) and national average (160 Qtls/ha). The average income from Onion cultivation is Rs.85,000 to Rs.1,00,000 per ha. In fact, successful onion production depends mainly on the selection of varieties that are adapted to different conditions imposed by specific environment. The main reasons behind this low productivity are - cultivation under rainfed condition, delayed on set of monsoon and non-adoption of high yielding varieties, particularly in the main *Kharif* season. This led to low yield and susceptible for purple blotch disease during *Kharif* season in Tumakuru District. The shelf life of Bellary Red is also not up to the desired level (60 days only). Further, analysis of soils in eastern dry zone, red sandy region revealed that about 40 per cent saline % soils and 60 per cent soils were low in organic matter. Due to these factors along with high fluctuations in the market rate, cultivation of onion has become almost a gambling among farmers.

**2. Technology details:** Arka Kalyan the onion variety released by ICAR-Indian Institute of Horticultural Research in the year 2004 is most suitable for *Kharif* season, tolerant to purple blotch disease which is found to be good to addressing the above mentioned issues effectively. ICAR-KVK under ICAR-IIHR has taken up many Front Line Demonstrations (FLD) in order to show the yield potential of this variety. An FLD on Integrated Crop Management (ICM) in Onion with technological inputs like Arka Kalyan variety, vegetable special as a micro-nutrient supplement and other plant protection measures, was conducted for three years (2014-17) during *kharif* season in the farmers' fields of Bukkapattana in Sira Taluk and Hosakere Madhugiri Taluks of Tumakuru district. The variety showed improved performance in case of quality parameters viz., Colour (Pink rose colour), bulb shape, tolerant to pest/disease, tolerant to moisture stress, shelf life (3 to 4 months) etc., To support the cause, KVK has taken up participatory seed production activities as well in the farmers' fields (Hosakere, Madhugiri in 4 acres)

**3. Yield and output details:** The results showed an increase of 42.84 per cent in yield, over the local Bellary Red. (Arka Kalyan- 253.4/ha and Bellary Red 177.3/ha). There was a reduction in the disease / pest incidence to the tune of 33 per cent. Due to these reasons, the variety gained its adoption in an area of 170 acres by 75 numbers of farmers over a period of three years. Thus, the total production in the district had gained an additional 38 per cent by using Arka Kalyan in an area of 145 ha. Under seed production activity, there was a production of 12 qtls from an area of 4 acres. There has been an increase in the interest of farmers to take up seed production of Arka Kalyan, as an income generation activity.

**4. Income/profit and development:** In an area of one ha, there was an additional production of 76 Qtls and additional income of Rs.80,000 by growing Arka Kalyan. Considering the spread of technology over an area of 170 ha, there has already been an additional production (on an average) of 45 Qtls and income of Rs 40,000 for 56 farmers. If the technology spreads to the total 650 ha of onion cultivation, there could be a possibility of gain in production to the tune of 42 per cent and an additional income of Rs 76,000/ha/farmer. This is almost double the income of what the farmer gains on an average per ha.

Table: 1 : The table below shows the potential of the technology over the check.

Particulars	Bulb wt(g)	Ave. Yield ( tons/ha)	% Increase	Gross Cost (Rs./ha)	Gross Returns (Rs./ha)	Net returns (Rs./ha)	B:C ratio
Demonstration	99.50	25.34	42.84	96,560	2,53,400	1,56,840	2.72
Check (Bellary Red)	92.10	17.74		96,560	1,77,380	80,820	1.91

**5. Conclusion:** Doubling of Farmers' Income is possible only through proper planning and adoption of advanced Package of Practices in which new technologies like high yield and disease resistant variety, marketability and shelf life should be included. More crop per drop should be the mantra of farmers in adopting drip irrigation, mulching and other water management technologies. Use of mechanization in sowing seeds through IIHR Onion Seed Drill (Manual and Mechanical) can overcome the labour problem. During the market glut, Arka Kalyan onion can be stored in room temperature for four to five months without any quality deterioration. Post-harvest technology products like Dehydrated Slice, Powder, and Paste would also fetch more price for farmers. All these would contribute in doubling the farm income in due course.



**Onion –Arka Kalyan Demo plot**