National Agricultural Technology Project



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# Technology Assessment and Refinement through Institution Village Linkage Programme

**PROJECT ACHIEVEMENTS** 











ICAR RESEARCH COMPLEX FOR GOA OLD GOA - 403 402 GOA, INDIA

**Technical Bulletin 5** 

#### NATIONAL AGRICULTURAL TECHNOLOGY PROJECT

## TECHNOLOGY ASSESSMENT AND REFINEMENT THROUGH INSTITUTION VILLAGE LINKAGE PROGRAMME

PROJECT ACHIEVEMENTS AN OVERVIEW





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Printed at: Bandekar Offset, Curchorem - Goa.

#### FOREWORD

National Agricultural Technology Project on Technology Assessment and Refinement through Institution Village Linkage Programme (TAR-IVLP) was started at ICAR Research Complex for Goa in September 2000. A comprehensive survey was undertaken in the selected villages in Ponda & Tiswadi talukas of Goa, initially to identify and prioritize the field problems. A multi-disciplinary team involving disciplines of Agronomy, Horticulture, Plant Protection and Animal Science along with Computer Application is actively engaged with the implementation of the programme.

The technological interventions covered under the programme are for the overall upliftment of the farmers keeping in view the need, resource base and the potential. It was observed that there is a good response from the client groups in the selected villages for the programme. The present publication gives a glimpse of the technological interventions covered under the project. I hope this publication will be useful in highlighting the programme for the benefit of farmers as well as line departments.

Goa August, 2005 V. S. Korikanthimath Director

#### THE BACKGROUND

As rainfed agriculture development in coastal ecosystem is based more on efficient resource management, it has been realized that alignment of research objectives with local agricultural requirements and resource management practices through participatory approach is necessary for development of appropriate farmer oriented technologies. This is particularly important if the farmers belong to risk prone and low- income categories. It is only through involvement of such farmers that their needs and aspirations in development of technologies can be adequately dovetailed. Technologies generated at the Research Station were passed on to the farmers in the technology transfer programmes. Farmers were passive participants in this "Take it" or "Leave it" approach. Keeping these aspects in view, the Institution-Village Linkage Programme for Technology Assessment and Refinement in Coastal Agro-ecosystem was proposed to give desired focus to the farmers' needs, resources and local environment. In this programme, the farmer is also an active partner in the development and transfer of technologies for both decision making and implementation.

The villages selected were free from urbanization and with minimum absentee landlords. The information about the agro- ecosystem and socioeconomic condition in the villages were obtained through suitable Participatory Rural Appraisal Techniques (PRA). Through these tools, soil conditions, seasonal cropping patterns, their preference to crops and their requirements were assessed. The problems of the village have been prioritized with farmer's participation considering their needs and resources. Hence different technology modules encompassing area of arable farming, horticulture based cropping system, field crops based cropping system, livestock farming, management of degraded lands and off-farm activities were formulated in consultation with the farmers. A glimpse<sup>++</sup> of the problems identified are listed below:

Problems identified	Causes	Technologies implemented	
Low yields in Coconut	Lack of technical know-how		
	Non-cultivation of improved varieties		
	Negligence towards pest and diseases –		
	i) Bud rot	Assessment of bud rot management in coconut	
	ii) Stem bleeding	Assessing the performance of integrated management for stem bleeding in coconut	
	iii) Red palm weevil	Assessing the performance of integrated management of red palm weevil in coconut	
	iv) Rhinoceros beetle	Assessing the performance of integrated management of Rhinoceros beetle in coconut	
	Non-adoption of improved package of practices		

	Lack of intercropping	Assessment of mixed farming in plantation crops Assessment of high yielding variety of pineapple as mixed crop in coconut garden
	Less use of organics Poor investment capacity	
Low yields in Arecanut	Negligence towards diseases (fruit rot or Koleroga)	Assessment of fruit rot management strategies in arecanut
	Use of local varieties	
	Inadequate nutrient supply	
	Lack of intercropping	Assessment of mixed farming in plantation crops
	Following indigenous pakage of practices	
	Less use of organics	
	Poor investment capacity	
Low Yields in	Lack of technical know-how	
Cashew	Use of local varieties	Assessment of top working
1	Plantation by seedling Progeny	in local cashew plantations
	Negligence towards pest and	
	diseases	
	Water loss due to run-off	
Low yields in	Negligence towards pest and	
Ivialigo	diseases	
	Alternate bearing in Mankurad variety	Assessment of Paclobutrazol in solving the problem of alternate bearing in Mango
	Growth of Loranthus parasite	Use of Loranthus cutter
	Lack of technical know-how	Use of improved mango harvester
	Poor investment capacity	

Low yield in vegetables	Use of local varieties	Assessment of high yielding variety of bhendi, cluster beans and cucumber
	Diseases i) Lack of awareness about the disease ii) Non-availability of pesticides Negligence towards pest and diseases	Assessing the performance of management of powdery mildew in bhendi Assessing the performance of management of wilt in brinjal
	Lack of technical know-how	
	Less use of organic manure	
	Poor investment capacity	
Poor yields in paddy	Use of locally available mixed seed	Assessment of high yielding, pest tolerant varieties of rice Hybrid rice production technology Assessment of high yielding, salt tolerant varieties of rice
	Manual operations involving drudgery and costly labour	Assessment of paddy transplanter in reducing cost of transplanting in sandy - sandy loam soils with plain topography Use of improved tools for increased labour use efficiency Use of Cono-weeder for control of weeds in drill sown rice
	Poor management	

	Pest and diseases i) Lack of awareness about pest and its management ii) Non-availability of pesticides	Assessing the performance of management of blast in paddy
sweet potato	Poor management i) Hand irrigation ii) Poor fertilizer management	
	Non-availability of improved varieties	
	Weevil i) Lack of awareness about pest management ii) Non-availability of chemicals	Assessing the performance of management of weevil in sweet potato
Low milk	Local breeds	
production	Diseases	Detection and prevention of Mastitis
	Imbalanced nutrition	Assessment of urea molasses treated straw in lactating cows during lean season
	Breeding and reproductive problems	
-	Ecto & Endo parasites	
	Local breeds	Assessment of crossbred pigs for better production
Low production in pigs Diseases		

	Imbalanced feed	Formulating balanced feed for pigs with locally available ingredients and by-products
	Ecto & Endo parasites	
	Lack of proper housing	
Low production in rabbits	Local breeds	Assessment of Soviet chinchilla rabbits for meat production
	Disease like mange	×
	Imbalanced nutrition	
	Improper housing	
Low production in backyard poultry farming	Local breeds	Assessment of improved breeds of poultry birds for backyard poultry farming
	Disease like fowl pox, R.D., Worm load	



Hybrid rice (KRH-2) at IVLP assessment plot in Pilar

# Assessment of hybrid rice in farmer's fields at Velling





Improved variety of cowpea V-578 being assessed at farmer's fields

Mixed farming of hybrid Napier in coconut garden at Goa Velha



### **TEHNOLOGIES ASSSESSED**

#### **1. CROP SCIENCES**

#### High yielding, pest tolerant varieties of rice

The locally grown mixed seeds of ruling varieties of rice *viz.*, Jaya and Jyoti, yield less and are susceptible to gall midge, leaf folder, brown plant hopper and blast. Further, the productivity of rice in saline soils which occupy a sizeable area (18000 ha) in the State is very low, owing to cultivation of local varieties which are low yielders and lodging types. Hybrid rice Sahyadri and KRH-2, pest tolerant varieties Krishna Hamsa, Karjat-3, Triguna and salt tolerant varieties CSR-10 and CRS-27 which had performed better in the Institute rice trials were taken up for assessment under the programme. A substantial improvement in the yield levels were observed with hybrid rice registering an increased yield up to 60 per cent, over the ruling varieties while the high yielding varieties Karjat-3 and Triguna showed better grain yield and cooking quality.

#### High yielding varieties of cowpea

Cowpea is a common crop grown during rabi-summer season in rice fallows under residual moisture situations. The local cowpea, although is bold seeded and fetches good price in the market, the yield potential is relatively less. Keeping this in view, proven varieties of cowpea from the Institute were tried in farmers' fields. Varieties V-118, V-585 and V-578 performed well with average yield levels of 13.25 to 15.50 q/ha as compared to local cowpea (8.80 q/ha).

#### Mixed farming in plantation crops

In Goa, majority of the plantation crops like coconut and arecanut are monocropped. They are widely spaced, scope exists for intensification of cropping. Further, dairy industry is still in its infant stage in Goa and continuous availability of green fodder is one of the limiting factors for dairy production. At the Institute trials it was observed that intercropping of coconut and arecanut gardens with high yielding perennial forage grasses is a viable proposition. Keeping this in view, an attempt was made to assess high yielding forage grasses hybrid Napier PBN-16 for its performance as intercrop in coconut gardens. The forage grass was observed to yield 26.05 t/ha/harvest with better palatability. Being perennial and least investment on land preparation, seed or plant protection, the system resulted in a better cost : benefit ratio (1:1.21).

#### Use of improved tools for increased labour use efficiency

As labour is costly and scarce in Goa, any attempt to save the labour requirement is a boon to the farming community. Keeping this in view, an attempt was made to assess the suitability of improved (Vaibhav) sickles developed by Konkan Krishi Vidyapeeth, Dapoli for paddy and other crop harvests. It was observed that the sickles are becoming popular with the farmers as they are light in weight, with better cutting edge, working angle and saves about 5 mandays/ha while the cost is also affordable by the farmers.

#### 2. HORTICULTURE

#### **Gladiolus cultivation under Goan conditions**

In Goa, the local flowers like Marygold, Jasmine and Crossandra cultivation is common although they are less yielding. Eighty five percent demand for cut flowers is met by importing the flowers from Bangalore. Keeping this in view, Gladiolus was taken up as an intervention under this programme. It was a new introduction as commercial crop in the adopted villages. Different gladiolus varieties *viz.*, White prosperity, Fidelo, Mascagni, Rose Supreme and Novalux were assessed for their adaptability. All the varieties performed very well. White prosperity and Mascagni being the best recorded with maximum spike length (121.37cm) and maximum number of flower buds, fetching higher price.

#### High yielding variety of Bhendi

Although the local variety of bhendi gives good sized fruits, it is susceptible to Yellow Vein Mosaic and is low yielding. As a solution, a high yielding and resistant variety of bhendi, Parbhani Kranti released by Marathawada Agricultural University, Parbhani was introduced in the adopted villages. The superiority of this variety with regards to yield over the local variety was confirmed through assessment trials (2000-01 to 2004-05) under this programme. The percent increase in yield was more than 30 per cent than the local variety in all the trials.

#### High yielding variety of cluster bean

A high yielding variety of cluster beans, Pusa Navbahar has been widely accepted by the farmers in the Tiswadi villages owing to higher yield (up to



An improved sickle developed by KKV, Dapoli



"Hands-on" experience with Cono-weeder in Paddy field



Assessment of high yielding variety of cluster beans (Pusa Navbahar)

Field demonstration of high yielding bhendi variety "Parbhani Kranti"



87.96 q/ha) over the local variety and its pod length due to which the harvesting cost is also reduced.

#### Improved mango harvester for mango cultivation

Mango holds an important place in the fruit market of Goa. Harvesting of mango done by local zela results in 35 percent damage to the fruits. Improved mango harvester developed by Konkan Krishi Vidyapeeth, Dapoli, is very efficient over the local zeal. It does not give a jerk while harvesting and involves no drudgery, while the fruits get harvested with the stalk, thus reducing the rotting by 5 percent.

#### 3. PLANT PROTECTION

#### Fruit rot management in arecanut

Fruit rot in arecanut was a major problem diagonised in Velling and Priol villages that resulted in low nut yields. Pre and post monsoon sprays of Bordeaux mixture and covering the inflorescence with polythene effectively controlled the fruit rot. Although, polythene covering was more effective (87% increase in nut yield over control) than Bordeaux Mixture (81% increase in nut yield over control) in controlling the disease, the farmers preferred spraying Bordeaux Mixture, as covering with polythene was laborious.

#### Integrated management for stem bleeding in coconut

Stem bleeding is observed in some farms in Goa Velha and Batim villages. Of the total number of trees (45) treated for stem bleeding through bark chipping and application of coaltar, root feeding of Calaxin and neem cake, 78 per cent of the trees survived whereas the severely infested trees did not recover. Also, 32.1 per cent increase in yield was recorded in the survived trees.



Assessment of wilt management in brinjal using *Trichoderma spp.* in Pilar village



Demonstration of top working in cashew



Field day on gladiolus cultivation at Pilar

Discussion with farmers about arecanut fruit rot management



#### Integrated management of red palm weevil in coconut

Root feeding of monocrotophos and pheromone traps for RPW were introduced in the adopted villages for management of red palm weevil in coconut. Digging to find a vigorously growing root was observed to be a labourious job. Due to high cost of the pheromone lure, marginal farmers are hesitant to use this technology. However pheromone trapping has gained wide popularity in the villages. An area of 34 hectares has been covered under this technology. No fresh infestations were recorded since the implementation of this technology in the farms.

#### Management of Powdery mildew in bhendi

Powdery mildew is observed during *rabi* season in bhendi crop which results in 8-21 per cent economic loss. The farmers in the adopted villages were unaware of the control measures of the disease and some would spray the wrong chemical. Hence this technology was implemented. Selected infested plots in the adopted villages were treated with 0.1% Calixin and observed for yield along with control plots. Treated plots on an average recorded up to 28.80 per cent increase in yield over the control.

#### Wilt management in brinjal

Wilt in brinjal is prevalent in all the adopted villages of Tiswadi taluka but significant loss has been observed in Agacaim. No farmers take any measures to tackle this problem. *Trichoderma* is found to be effective in suppressing the causal agents *Fusarium* and *Ralstonia solanacearum* in vitro. Seedling dip and drenching soil with *Trichoderma* checked the percent mortality (3.94) of brinjal





Pheromone Trap for control of Red palm weevil in Coconut

Calixin application to manage stem bleeding in Coconut

Backyard poultry unit with improved breed (RIR)





Assessment of high yielding bhendi variety at farmer's field

plants (the percent mortality was 10.15 in control plots) and resulted in 11.76 percent increase in yield.

#### Management of weevil in sweet potato

Sweet potato is widely cultivated in the rice fallows during rabi-summer season in the Tiswadi taluka. The weevil *Cylas formicarius* Fab. was found to cause considerable damage and thus reduce the marketable yield by 30-40 per cent. For management of the weevil the vines were dipped in monocrotophos solution before planting and two sprays of endosulfan were given at 30 and 50 days after planting. Maximum percent damage recorded was 11.20 in treated and 28.20 in control plots. The marketable yield was 8.10 t/ha and 6.92 t/ha, respectively, in treated and control plots.

#### Bud rot management in coconut

Bud rot is a lethal disease for coconut if not managed timely. It can be prevented by pre and post monsoon sprays of Bordeaux mixture. Ten coconut gardens were selected for the assessment of this technology. Eighty two percent of the trees treated for bud rot with Bordeaux mixture (1%) recovered. However, few trees in the advanced stage of the disease died. The observations revealed that prophylactic spray and early detection is important to control the disease.

#### 4. ANIMAL SCIENCE

#### Crossbred pigs for better production

The intervention was proposed to increase the production performance of pigs in backyard farming system as the performance of local, non-descript pigs is poor. Local x Yorkshire cross-bred pigs were assessed at 11 places in



Field demonstration of sweet potato variety at Agassim



Field demonstration of vegetable cultivation



Demonstration of Urea - molasses enrichment of straw

Field unit of piggery with crossbred pigs



Tiswadi taluka. Observations made on farmers fields indicate that the crossbred pigs have faster growth rate and larger litter size than the local ones. The margin of profit in backyard pig rearing increased with a cost: benefit ratio of 1:1.67. Thus, rearing crossbred pigs was found more profitable.

#### Improved breeds of poultry birds for backyard poultry farming

This intervention was planned to improve the performance of the backyard poultry units in the farmers' field. The improved dual purpose poultry breeds *viz*. Giriraja, Vanaraja and RIR were assessed in Pilar, Agacaim and Goa Velha. It was observed that these birds are well suited for better production and profit under backyard rearing. The farmers are convinced about the better performance of the birds and have started adopting the technology. This is evident as many farmers are approaching the Institute for the improved breeds. Some farmers are multiplying these birds by using the fertile eggs from their units.

#### **Detection and prevention of Mastitis**

For detection of mastitis in dairy cows, milk samples from Veling, Priol and Goa Velha were collected and subjected to California Mastitis Test, culture and antibiotic sensitivity test. Although samples were not positive for clinical mastitis, in some cases the microbial load was found high which is a predisposing factor for mastitis. *Pasteurella* sp., *Pseudomonas* sp., *Staphylococcus* sp., *Lactobacillus* sp., and *Proteus* sp. were isolated from the milk samples collected. Animals in which higher microbial count was recorded, were given Teat dip solution for disinfection. This practice reduced the bacterial load in milk substantially. Teat dip after milking was demonstrated to the farmers to help in preventing mastitis, which is a serious problem in milch animals.

#### Balanced feed for pigs

Since pig farming is not an organized commercial farming sector, pig feed is not commercially available in the local market. Farmers practice feeding kitchen wastes, hotel wastes, vegetable waste, broiler offals etc. to their pigs. Feeding is a major constraint for the pig farmers of Goa. Also, this leads to the underperformance of the animals. Keeping this in view, low cost balanced feed with locally available by-products (dried cashew apple waste) was prepared and assessed with five farmers having cross-bred pig units. Balanced feed with 50% kitchen/hotel/vegetable waste/broiler offal + 50% low-cost compound feed was given to the adopted animal and the growth rate was compared with the conventional feeding of kitchen/hotel waste. The average daily weight gain was improved with this feeding practice (210g/day), as compared to with conventional feeding method (180g/day). From the observations made at farmers' field it can be concluded that balanced feeding gives better nutrition to the animals and this can be recommended for back yard rearing.

#### TRAINING PROGRAMMES CONDUCTED UNDER IVLP

SI. No.	Date	Venue	Торіс	No. of participants
Horti	Horticulture			
1. 2. 3. 4.	23 <sup>rd</sup> February, 2001 10 <sup>th</sup> April, 2001 6 <sup>th</sup> May, 2002 9 <sup>th</sup> January, 2003	Veling Pilar Agacaim Pilar	Grafting techniques in cashew Vegetable cultivation Vegetable cultivation Gladiolus cultivation	29 38 19 22
Crop	Sci <u>e</u> nce	2		
1. 2 3. 4.	8 <sup>th</sup> November, 2002 15 <sup>th</sup> November, 2002 22 <sup>nd</sup> November, 2002 23 <sup>rd</sup> August, 2003	Pilar Velling Pilar Institute	Importance of hybrid rice cultivation Hybrid rice and cowpea Groundnut cultivation Cono weeder usage	56 45 12 24
Plan	t Protection			
1.	9 <sup>th</sup> February, 2001	Priol	Pest management in plantation	10
2.	16 <sup>th</sup> February, 2001	Pilar	Pest management in plantation crops	19
3.	17 <sup>th</sup> February, 2001	Veling	Pest management in plantation crops	09
4.	7th February, 2002	Veling	Pestand diseases management	24
5.	25 <sup>th</sup> July, 2002	KVK, Old Goa	Pest management in paddy	09
6.	17 <sup>th</sup> December, 2002	Agacaim Agacaim	Management of sweet potato	18
7.	18 <sup>th</sup> February, 2003		Pest management	20
Animal Science				
1. 2. 3. 4.	27 <sup>th</sup> March, 2001 28 <sup>th</sup> March, 2001 10 <sup>th</sup> April, 2001 21 <sup>st</sup> February,	Pilar Veling Pilar ICAR RC for	Poultry farming Poultry farming Piggery, Poultry and Rabbit farming Urea-molasses treatment	15 families 5 families 32 12
	2002	Goa	and fodder cultivation	



Group discussion with farmers in the adopted village (Velling)

Training on Hybrid Rice in progress..





Plant protection training in adopted village

Field demonstration of Rice hybrid KRH-2 at Velling



#### OTHER EXTENTION ACTIVITIES UNDERTAKEN

- \* Six farmers attended Kisan mela at IARI campus, New Delhi during 15 17 March, 2001. The farmers visited the demonstration plots, exhibitions, green / poly houses at the Institute campus. The farmers appreciated the improved techniques in agriculture including green house technology for raising seedlings in cucurbitaceous crops like watermelon.
- \* Demonstration on management of fruit rot in arecanut and urea molasses treatment was taken up at farmer's field.
- A farmers meeting was organized at Velling on 15<sup>th</sup> November 2001 for discussion on hybrid rice and cowpea.
- \* Field day on rice was organized at Pilar on 28<sup>th</sup> September 2002 for discussing the impact of hybrid rice cultivation by visiting the demonstration plots of rice hybrid and other high yielding paddy varieties.
- Twenty five farmers from IVLP villages attended the Kisan Mela organized by ICAR Research Complex for Goa on 1<sup>st</sup> October 2002.
- \* A meeting was organized in Velling to discuss the importance of Hybrid rice cultivation on 8<sup>th</sup> November 2002 and subsequently on 13<sup>th</sup> of November 2002.
- \* A group discussion on groundnut cultivation was organized in Surlabhat, Agacaim on 22<sup>nd</sup> November 2002.
- A Group discussion on management of sweet potato weevil was conducted in Govt. Primary School, Surlabhat, Agacaim on 17<sup>th</sup> December, 2002.
- \* A programme on Gladiolus cultivation was organized on 28<sup>th</sup> December 2002 at Pilar Nature Farm, Pilar.

- \* A Field day on Horticulture was organized at Pilar Nature Farm on 21<sup>st</sup> February 2003 to ascertain the scope of Floriculture in Goa; especially on Gladiolus cultivation. Problems associated with vegetable cultivation were also discussed. Importance of *Loranthus* cutter and Mango harvester were discussed with the farmers.
- Demonstration of Cono-weeder was taken up at ICAR Research Complex, Old Goa, on 23<sup>rd</sup> August, 2003.
- \* A Field day (Kisan Mela) on Horticulture was organized at Pilar Nature Farm, Pilar on 14<sup>th</sup> October, 2003 wherein the problems faced by the farmers in Gladiolus cultivation and other horticultural crops including fruits, vegetables and vanilla cultivation were discussed.
- \* A Field Day was organized at Priol Milk Society, Priol on 31<sup>st</sup> March, 2004 for discussing the impact of hybrid rice cultivation and the use of Vaibhav sickles for harvesting of paddy. Hybrid rice assessment plots in Priol were visited and use of improved sickles were demonstrated to the farmers.

