PROCEEDINGS OF MEETING WITH DIRECTORS OF AGRICULTURE, NABARD, AND ICRISAT SCIENTISTS HELD ON 6 APRIL 1984 AT ICRISAT CENTER, PATANCHERU, A.P., INDIA

ICRISAT

FARMING SYSTEMS RESEARCH PROGRAM

International Crops Research Institute for the Semi-Arid Tropics
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PROCEEDINGS OF THE MEETING WITH DIRECTORS OF AGRICULTURE NABARD, AND ICRISAT SCIENTISTS FOR DISCUSSION OF THE IMPROVED MANAGEMENT OF VERTISOLS

OBJECTIVES OF THE MEETING:

A one day meeting was convened between the Departments of Agriculture of Andhra Pradesh, Tamilnadu, Maharashtra and Karnataka, NABARD, and ICRISAT scientists, to discuss the implementation of the technology for improved management of deep Vertisols.

The main objective was to find out the experience of the Departments of Agriculture of the 4 states with regard to adoption and implementation of the technology and to discuss some of the technical, infrastructural and socio-economic problems that had evolved.

Specific objectives of the meeting may be outlined:

1. To discuss the performance of the technology in the sites selected and managed by the Departments of Agriculture,

2. To identify the components of the technology that need further research or deliberations with related agencies,

3. To prepare a set of guidelines for the identification of projects for improved Vertisols management,

4. To discuss how best to diffuse the technology to the farmers most efficiently,

5. To draw up a plan of action for 1984-85 (kharif 1984 and rabi 1984-85).

BACKGROUND

Dryland agriculture in India has received little attention over the past decade. Cereal productivity rarely exceeds 500-700 kg/ha and farmers have little reserve capital for investment in seed and fertilizers. Current practices normally generate only one crop per year, whereas there is a vast potential, particularly in Vertisol areas (Fig. 1), to double productivity by taking two crops per year. However, heavy rains during the monsoon create problems of drainage and the soils become unmanageable. ICRISAT has developed an improved management of Vertisol technology (IMVT) whereby land is developed on a watershed basis and onto which broad beds and furrows (BBF) are superimposed to accommodate adequate drainage of the soil and optimise soil moisture content. This, incorporated with improved cropping systems, improved farm implements, high yielding crop varieties and moderate fertilizers and pesticides, has led to a productive system for increasing agricultural output. It may be emphasized that although the ICRISAT Vertisol technology was presented as a package that required timely application of its different components, it should be used with intelligent [illegible]

the specific characteristics of the location. Thus the watershed layout and cropping systems should be adjusted to suit the local climate, and, in particular, the rainfall pattern.

In order to obtain comprehensive results, OFV trials require multi-locational testing with continuous monitoring. Effective dispersion of a new technology is problematic, requiring precision orientated work carried out by high quality personnel. Training and extension facilities need to be offered to both agricultural officers and farmers in order to obtain proper adoption. ICRISAT's staff cannot handle the training and extension necessary, and must depend upon the Department of Agriculture for effective dissemination of the technology. One of the major problems encountered in former years was the continual turnover of personnel within the Department of Agriculture which caused a severe dilution in the effectiveness of any training carried out by ICRISAT. In this respect a critical issue to be discussed is how to communicate the technology to the field level most effectively.

ICRISAT's MANDATE AND OVERVIEW—Dr. L.D. Swindale

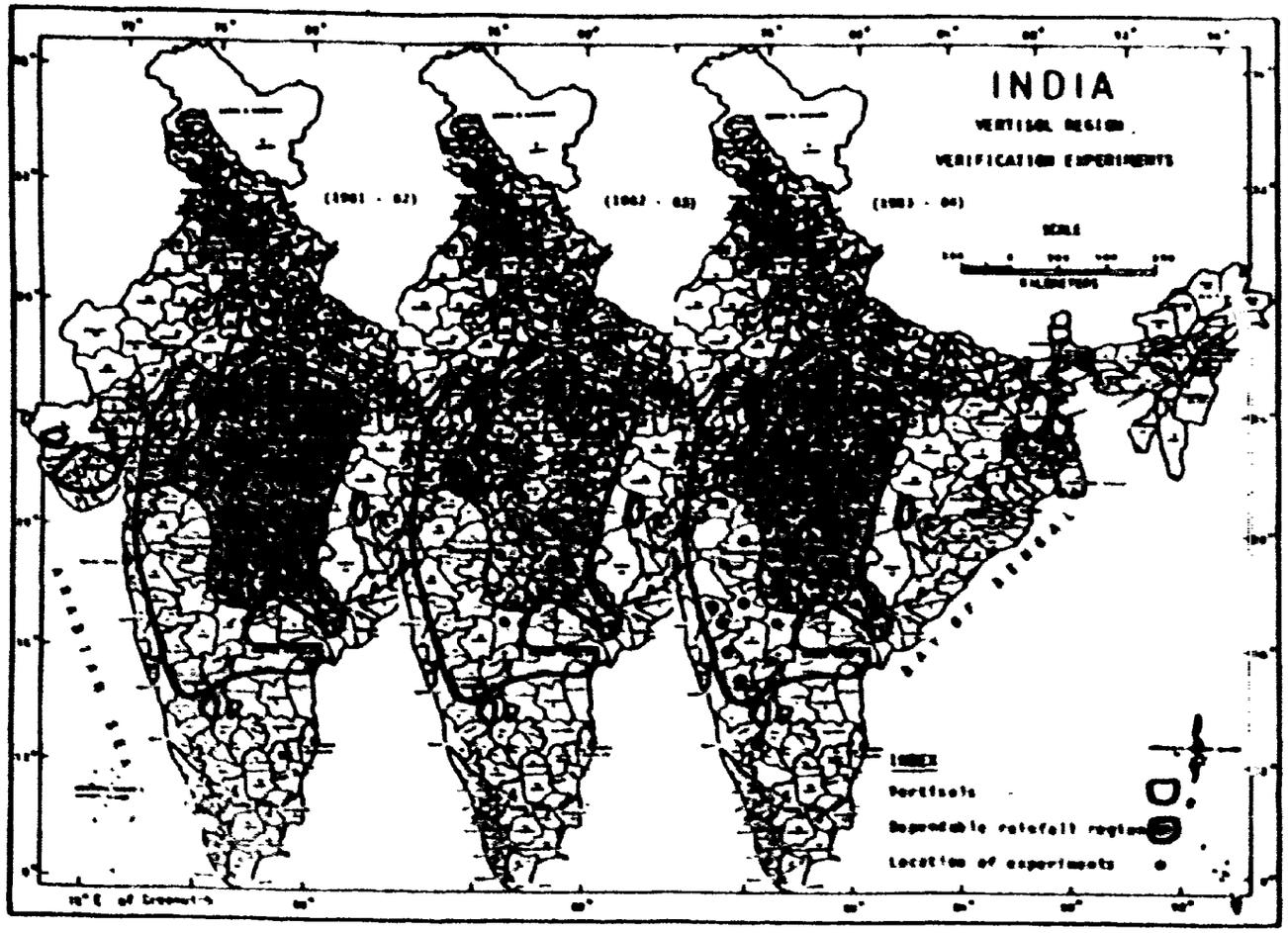
Evidence has long shown the need to close the widening gap between dryland and irrigated agricultural productivity. ICRISAT research is therefore focussed on dryland agriculture for the major food crops in semi-arid areas. Due to the low creditability of dryland farmers, banks are often reluctant to offer assistance to the farmers. The NABARD/ ICAR/ICRISAT workshop, 3-4 October 1983, has already discussed means to alleviate credit, loan and repayment problems, and considered increased productivity in pulses to be a key factor to dryland agricultural economic survival.

It should be emphasized that IMVT is still in the pilot stage and requires a further 2-3 years for on-farm verification (OFV). On-farm research has shown the extensive need for training farmers and Department of Agricultural personnel in the new technology. Also it is evident that the farmers' choice of cropping system is not always the best and that he could be persuaded to try new and more efficient systems.

Dr. Swindale pointed out that on-farm research at ICRISAT has now taken on a new framework and is designated as a sub-program within the Farming Systems Research Program; it is headed by Dr. D. Sharma. A separate budget has been allocated for the research and it is therefore expected to take on accelerated developments.

PROGRESS OF TESTING AND EVALUATION OF IMVT 1981-83 AND PLANS FOR 1984

In 1981 an OFV trial was initiated as a pilot project in 15.4 ha at Taddanpally village (A.P.). Now in 1984 the IMVT is operating at 28 districts in four states in India and involving 1406 farmers. (Fig. 1). Monitoring of field operations show that economic returns can be increased by 244%. However, a continuous influx of data from different sites shows variations of 26-2000%. This information emphasizes the need for multi-locational testing and evaluation of the component of the technology.



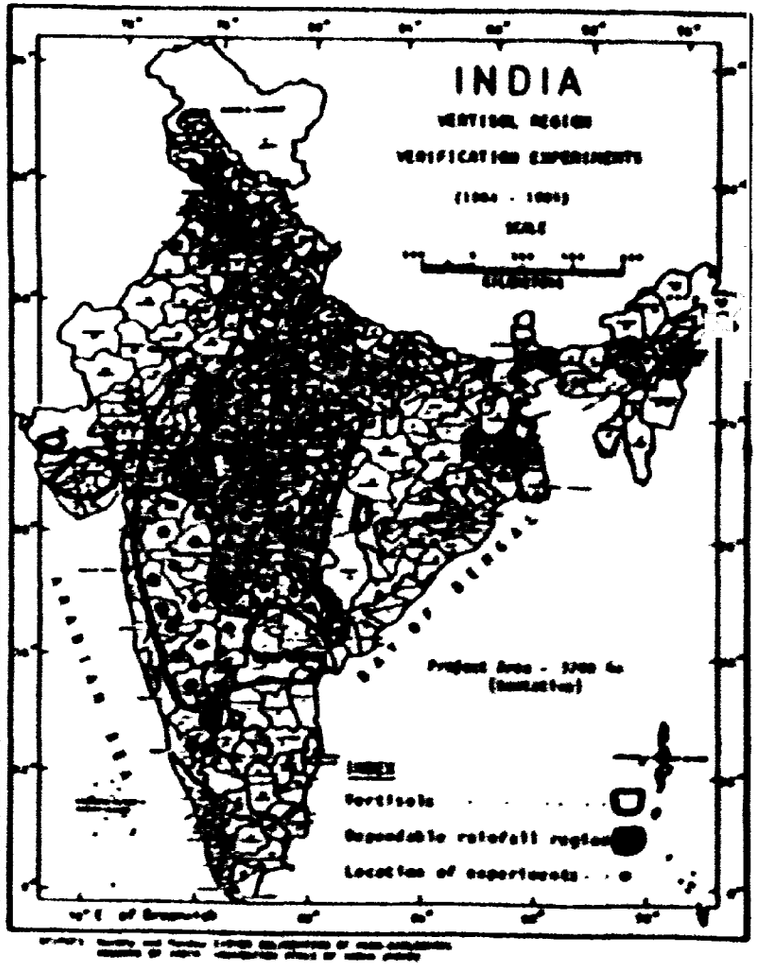


Fig. 2 Projected locations and area for on-farm verification trials 1984-85.

KARNATAKA

In Karnataka 17.5% of the total cultivated area is irrigated which accounted for 60% of the agricultural productivity. The remaining area, constituting 1.5 million ha, was dryland and contributed only 40% of agricultural production. Emphasis must therefore be given to dryland agriculture. ICRISAT technology has been adapted to suit 10 climatic zones in Karnataka and 2 major soil types--Vertisols and Alfisols. A variety of cropping systems have been used involving intercropping, sequential cropping and ratooning for principal cereal crops, pulses, oil seeds, and some agroforestry.

The implementation of the technology was highly successful, primarily due to the versatility employed in its application. Notably, the broad beds of the BBF system was varied in width in accordance with the soil clay content and the rainfall received. In addition, the tropicultor was operated on Alfisols, hitherto not considered a viable proposition. A total of 1353 ha has been selected for implementation of ICRISAT technology in Karnataka, of which 227.5 hectares has been taken up in 6 districts in 1983.

Some specific observations that were made in Karnataka concerning the ICRISAT technology were:

1 Funds were not always available to farmers for inputs.

2. Dry seeding is not an essential component of the technology.

3. Rainfall probability chart provides a general picture but is inadequate in predicting the precise date of the onset of rains.

4. Markets must be available to accommodate introduction of new crops or increased productivity.

5. Fixed pricing of produce is required. Increase in yield is of no benefit to the farmer if crop prices are low.

6. Inputs must be available--farmers' decisions on the effective cropping pattern to be taken up, may change on a daily basis, inputs such as seed, fertilisers, and agrochemicals must be available at all times.

7. There is still a need for developing correct and precise methods of transfer of dryland technologies.

PLANS FOR IMPLEMENTATION OF ICRISAT TECHNOLOGY 1984-85

In 1984-85 IMVT will be expanded to cover 995 ha in 9 districts. For this purpose 83 tropicultors are already provided and an additional number will be purchased.

District	Current No. of ha under IMVT	No. of tropicultors (1983)	No. of hectares to be implemented 1984-85
Dharwad	63.5	10	182
Bijapur	-	-	50
Raichur	4	1	21.
Belgaum	10	2	30
Bellary	8	1	22
Gulbarga	78	49	410
Bidar	64	20	220
Chitradurga			10
Chickmagalur			10
TOTAL	227.5	83	995.1

MAHARASHTRA:

Of 24 million ha. cultivable land in Maharashtra only 12.5% is irrigated. Even with maximum irrigation development this would not exceed 30% of the land, thus a thrust must be given to dryland agriculture. In Maharashtra, 75% of the total cultivable land is medium to deep black soils. Problems of waterlogging and erosion are inherent in these soils and consequently IMVT was first initiated in 1980 at Sholapur to counter some of these problems. In 1982 this was expanded to Akola and Parbhani districts. At Parbhani cotton yield increases of 128-165% were noted in IMVT plots compared to control plots. Similairly, about 8% yield increases were noted for sorghum, pigeonpea, mungbean and safflower. Unfortunately, at Akola, rains received were only 35% of the average annual rainfall, thus many of the crops failed.

Yield results under IMVT for 1983-84 were variable showing yield advantages of 6-200% for cotton, 10-124% for sorghum, 11-100% for mungbean, 21-200% for pigeonpea, 28-427% for pearl millet. In coordination with the ICRISAT technology it was decided to develop land on a watershed basis, thus 5065 watersheds have been selected for development. Within these watersheds 1198 ha was developed under IMVT in 1983-84 and will be expanding to 1945 ha in 1984-85. In the light of the current discussion it was remarked that IMVT was implemented without due consideration to the rainfall probability factor. Thus yield variability and certain failures occurred where rainfall was insufficient or undependable. Maharashtra would be keen to determine the rainfall [illegible] for different climatic zones.

PLANS FOR 1984-85:

Implementation of improved management of Vertisol technology in Maharashtra state 1983-84 and 1984-85.

District	No. of hectares developed 1983-84	Area designated for IMVT in 1984-85
Ahmednagar	6	6
Dhule	19	19
Jalgaon	11	11
Satara	6	6
Sangli	6	6
Aurangabad	25	25
Jalna	1	1
Parbhani	107	107
Nanded	79	79
Amravati	338	338
Akola	161	161
Buldhana	229	229
Yavatmal	53	53
Wardha	117	117
Nasik	-	787
Solapur	-	
Pune	-	
Total	1158	1945

ANDHRA PRADESH:

In Andhra Pradesh there is 11 million ha of cultivated land of which 68% is rainfed. About 26% of the agricultural lands are Vertisols of which 2 million ha is under dryland cultivation. Normally kharif fallow is maintained except in Adilabad district where a kharif-Rabi rotation is common.

Constraints to increased production and double cropping are:

1. Low soil fertility and reluctance of farmers to apply fertilizer due to undependable rainfall.

2. Lack of resources to adopt intensive cropping.

3. Undependable rainfall.

ICRISAT technology was adopted over a small area in Taddanpally and Sultanpur villages in Medak district during 1981-82 and 1982-83. In 1983-84 ICRISAT technology was extended to 6 districts in deep Vertisol and dependable rainfall zones. The area cultivated is furnished below.

Implementation of ICRISAT technology in Andhra Pradesh during 1983-84

District	Area (ha)	No. of farmers
Medak	59	61
Nizamabad	215	182
Warangal	96	51
Karimnagar	150	141
Khammam	100	84
Adilabad	100	52
Total	720	571

Particular aspects of the ICRISAT technology that were successful included the intercropping systems, dry seeding methods, seeder-cum-fertilizer drill and BBF system for large farm holdings. In addition, the practice of cultivation immediately after Rabi harvesting was found beneficial. However, proper implementation of the technology was not possible in all fields due to lack of manpower and funds. Thus some crops produced poor yield where land smoothing and BBF layout had not been carried out properly. It was therefore proposed to reduce the current cropping area in 1984-85 in order that correct and proper implementation can be focussed on a few sites. This point however is open to discussion.

MADHYA PRADESH:

The Director of Agriculture, sent a detailed report on IMVT implementation in Madhya Pradesh for which some key points are presented here.

In Madhya Pradesh 19 million ha are cultivated of which 12% is irrigated, 5-6 million ha. are fallowed in kharif of which 2.0-2.5 million ha. are deep Vertisols. Soybean is an increasingly popular crop grown on 850,000 ha. and covering much of previously kharif fallow land.

CURRENT RESULTS AND PROJECT PLANS FOR 1984-85:

ICRISAT technology was initiated in 1982 at Begumganj, Raisen district on 20 hectares and involving 9 farmers. Although there was some resistance by the farmers to the technology initially, results are now encouraging and farmers are enthused by the technology. Land development practices and different cropping systems were also tested at the government seed farm at Begumganj and in 1983 a similar program was developed at Phanda seed farm near Bhopal.

Although certain advantages were noted in the IMVT, the Dept. of Agriculture felt that verification must continue before expansion on a large scale; thus on-farm research is continuing at Begumganj watershed area, and at Phanda and Begumganj seed farms. In addition, five seed farms located at Indore, Sagar, Vidisha, Sehore, and Narsinghpur have been selected to test the technology and incorporate different cropping systems. Further, plans are also being made for a World Bank funded watershed project located at Sehore and covering 500 ha for 1984-85. It is hoped that ICRISAT will participate in the project although fixed plans are still to be finalized.

Implementation of ICRISAT technology in Madhya Pradesh 1982-84

Location	Area (ha)		
	1982	1983	1984
Begumganj village (Raisen)	23.8	16.2	16.2
Begumganj seed farm (Raisen)	1.3	1.3	1.3
Phanda " (Sehore)	-	8.0	6.0
Depalpur " (Indore)	-	-	( )*
Sagar "	-	-	( )
Vidisha	-	-	( )
Rehti " (Sehore)	-	-	( )
Narsinghpur "			

* Area to be defined

TAMIL NADU:

Tamil Nadu has not yet taken up IMVT, although the Director of Agriculture, Dr. Natarajan, indicated that a substantial area of Vertisols could be implemented. It is hoped that with further discussion, ICRISAT could give some advice and assistance for 3 pilot projects to be undertaken in Tamil Nadu.

FINANCING OF WATERSHEDS

NABARD proposes to finance 20-25 model micro-watershed projects to test the improved Vertisol management technology. Guidelines for formulation of the project can be obtained on request. In order that these projects be run successfully funding will be available for:

- Fertilizer distribution
- Technical support
- Farm machinery
- Infrastructure support systems
- Training requirements
- Loans to farmers

Defaulters for payment of previous loans will be allowed to enter the program in order not to distort the progress of the model watersheds. The Agricultural Research Corporation (ARC) has agreed to carry out the task and it was requested that the Departments of Agriculture of the different states identify suitable sites for the purpose. A proforma of the proposal was circulated to the participants of the meeting outlining the intentions and scope of the NABARD project. A short discussion followed and specific details for implementation of the projects will be finalised at a later date.

POINTS FOR FURTHER CONSIDERATION:

1. There is a need for extensive and efficient training of personnel in order that the technology be carried out precisely and effectively. It was proposed that ICRISAT be induced into the T&V system operating in Karnataka and thereby effectively disseminate the technology.

2. The tropicultor remains a problem and step-wise induction into the technology was proposed where the tropicultor can be introduced at a second stage. Quality of tropicultor produced by companies was often poor and currently are over-priced.

3. Financial assistance and availability of loans are lacking. Efforts should be made to ensure that the farmer is able to carry out the operations necessary in order to ensure proper verification trials.

4. Rainfall probability data is excellent for determining suitable cropping patterns and climatic zones, but still some research is required to pre-determine the onset of the monsoons.

5. In advising farmers on a new technology, importance should not only be given to cost/benefit ratio, but also to the initial cost of investment required.

SUMMARY

The meeting provided valuable interchange of information both between the Departments of Agriculture and ICRISAT scientists. New project proposals as suggested by NABARD for 1984-85 will be initiated in due course. Cooperation will be extended between ICRISAT and the Departments of Agriculture, Tamil Nadu to undertake new projects. ICRISAT will look forward to entering a new phase of its extension services by induction into the T&V system.

LIST OF PARTICIPANTS

T.V. Sampath, Director of Agriculture, Karnataka
U.S. Natarajan, Director of Agriculture, Tamil Nadu
J.Y. Patil, Joint Director of Agriculture, Maharashtra
Raghava Rao, Joint Director of Agriculture, Andhra Pradesh
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LIST OF ABBREVIATIONS AND ACRONYMS

ARC	Agricultural Research Corporation
BBF	Broadbed and Furrow
IMVT	Improved Management of Vertisol Technology
ICAR	Indian Council of Agricultural research
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
NABARD	National Bank for Agriculture and Rural Development
OFV	On-farm Verification
T & V	Training and Visit

OTHER SEMINARS

1. Improving the management of India's deep black soils. Proceedings of Seminar on management of deep black soils for increased production of cereals, pulses and oilseeds, New Delhi, 21 May 1981.

2. Second Policymaker's Seminar to Review the Program of the Improved Vertisols Management in Relation to Assured Rainfall Regions of India, ICRISAT, Patancheru, A.P., India, September 1982.

3. Watershed-Based Dryland Farming in Black and Red Soils of Peninsular India. Proceedings of Workshop held at ICRISAT Center, Patancheru, A.P., India, October 1983.

Program for the meeting of Directors of Agriculture to discuss the experiences of Deep Vertisol Technology in the different states and to plan for 1984-85 season

VENUE: BOARD ROOM

April 6, 1984

Dr. J.S. Kanwar, Chairman

Dr. R.T. Hardiman, Rapporteur

0900-0910	Welcome and objective of the meeting	D. Sharma
0910-0930	ICRISAT mandate and overview	L.D. Swindale
0930-1000	Our experience of verification of Deep Vertisol Technology	S.M. Virmani
1000-1015	TEA	
1015-1200	Deep Vertisol Technology status and experiences in different states: presentation and discussion	Directors of Agriculture
1200-1400	LUNCH	
1400-1500	Presentation of 'Project Guidelines' and discussions	NABARD
1500-1600	Plan for 1984-85 and concluding session	Directors of Agriculture