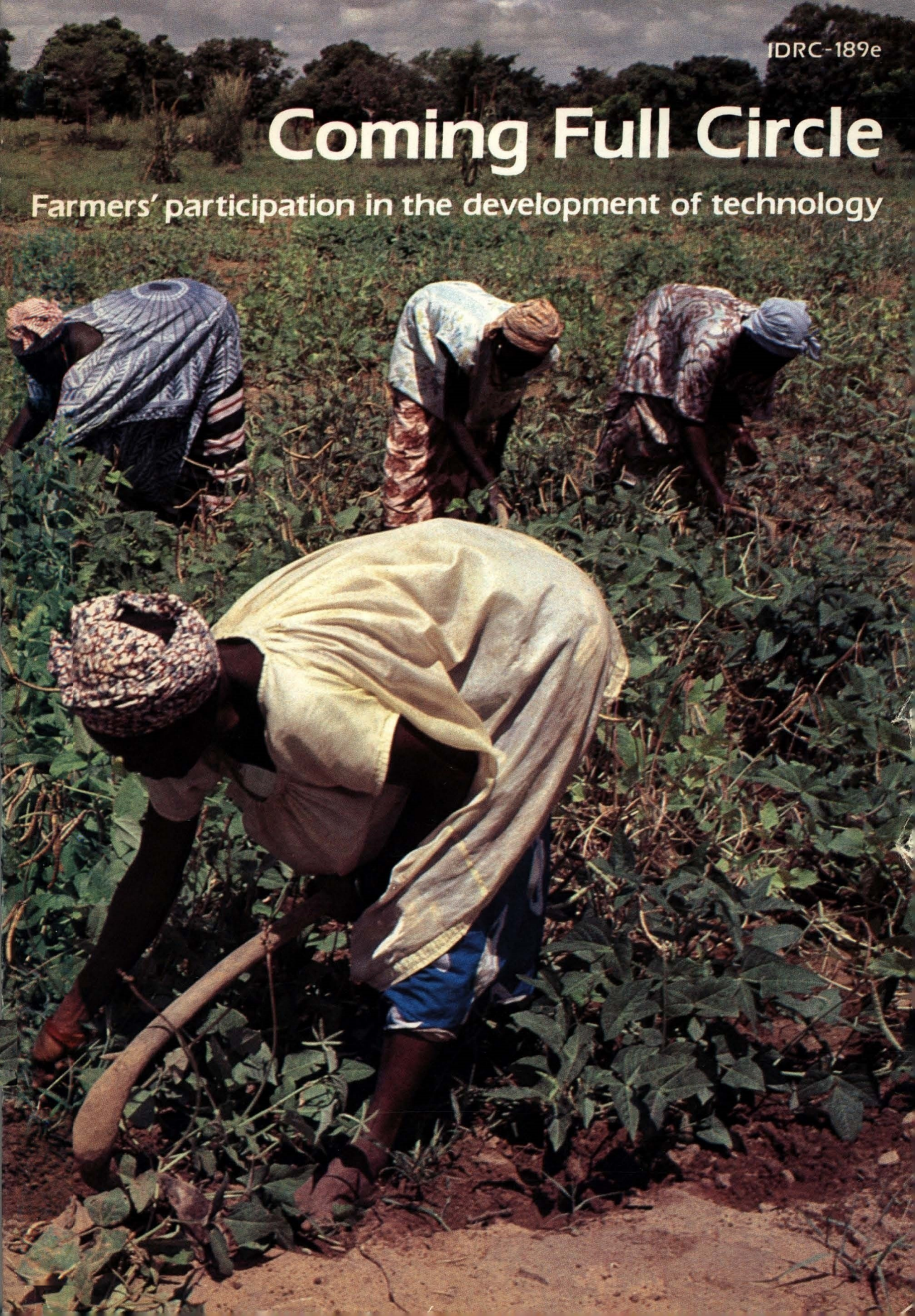
IDRC-189e

Coming Full Circle

Farmers' participation in the development of technology



Coming full circle: farmers' participation in the development of technology

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Abstract

Involving farmers in identifying the constraints to rural agriculture and in designing measures to alleviate them is the subject of this publication, which resulted from a meeting, held in Ouagadougou, Upper Volta, 20–25 September 1983. Agronomists, economists, anthropologists, and others seeking to get the most from research efforts discussed the pitfalls of assembling packages that are sound technically but have some essential flaw because the developers have overlooked some crucial constraint at the farm level. The subject is one that is receiving much attention currently as agriculture in developing countries has failed to net major increases in production despite thousands of dollars invested in research and optimistic claims that improved varieties, techniques, equipment, etc. have been developed. The gaps between results on research stations and those on farms in the Third World have prompted some researchers to view the farmers' conditions as the real laboratories. Why, how, where, and when to get farmers involved in research are the focus of this document, and the degree to which researchers and the agencies they represent have been able to listen and work with their new partners varies, as is clear from the 11 papers and the commentary that follows them.

Résumé

La participation des paysans à l'identification des problèmes agronomiques et à la recherche de leurs solutions est le sujet de cette brochure qui rapporte les états d'un séminaire tenu à Ouagadougou (Haute-Volta) du 20 au 25 septembre 1983. Afin de mieux exploiter les résultats des recherches, des agronomes, des économistes, des anthropologues et d'autres personnes intéressées ont discuté du danger de préparer des blocs agronomiques, solides sur le plan technique, mais possédant des vices fondamentaux, les développeurs n'ayant pas pris en compte certains obstacles critiques au niveau des fermes. Ce thème est largement débattu aujourd'hui alors que la production agricole stagne dans les pays moins avancés malgré l'injection de milliers de dollars dans la recherche et les espoirs mis dans la création de variétés, techniques et équipement améliorés. La différence entre les résultats obtenus dans les stations de recherche et ceux recueillis sur les fermes ont conduit des chercheurs à reconnaître que la ferme même constituait le vrai laboratoire. Le thème principal de cet ouvrage qui se dégage des onze communications présentées et des commentaires qui suivent, est donc de déterminer quand, où, comment et pourquoi les fermiers doivent participer à la recherche et aussi, jusqu'à quel point les chercheurs (et les organismes qu'ils représentent) ont su être à l'écoute des paysans et travailler avec eux.

Resumen

La participación de los agricultores en la identificación de las limitaciones a la agricultura rural y en el diseño de medidas para superarlas es el tema de esta publicación que resultó de una reunión celebrada en Ouagadougou, Alto Volta, del 20 al 25 de septiembre de 1983. Agrónomos, economistas, antropólogos y otros interesados en obtener lo mejor de los esfuerzos investigativos, discutieron los problemas de producir paquetes técnicamente válidos que no obstante presentan fallas básicas porque sus diseñadores han perdido de vista alguna limitación crucial a nivel de la finca. El tema recibe actualmente mucha atención debido a que la agricultura de los países en desarrollo no ha podido aumentar la producción pese a los miles de dólares invertidos en la investigación y a las optimistas voces que proclaman haber desarrollado variedades, técnicas, equipo y otros elementos mejorados. La brecha entre los resultados de las estaciones de investigación y aquellos de las fincas del Tercer Mundo han hecho que algunos investigadores consideren las condiciones de los agricultores como los verdaderos laboratorios. Por qué, cómo, dónde y cuándo involucrar a los agricultores en la investigación es el tema central de este documento, y el grado en que los investigadores (y los organismos que representan) han podido escuchar y trabajar con sus nuevos socios varía como lo demuestran los 11 trabajos del libro y el comentario final que los sigue.

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Farmers' participation in the development of technology

COMING FULL CIRCLE

Editors: Peter Matlon, Ronald Cantrell, David King, and Michel Benoit-Cattin

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Defining production units for research: an experience in Upper Volta

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The major aim of my work at IRCT is to propose operational tools on a meaningful scale, that will initiate dialogue with the major development partners, from the national level down to the individual plot. The population and environment chosen are as representative as possible so that the results, whatever they may be, can be extrapolated.

The unique aspect of this work is that there have been virtually no tools designed specifically for it. Some imagination was, thus, required to use the available data in a practical manner. An example is IRCT's work with the Bobo-Dioulasso Hauts-Bassins regional development organization (ORD).

Environment

First, the environment, which can be perceived at levels ranging from the region to the plot, was recently zoned. The work consisted of defining intermediate regions through an analysis of all available ecological, technical, social, and economic data. The Hauts-Bassins ORD region is almost exclusively within a region that has been labeled intermediate II, in which cropping systems are tied to cotton growing. At first glance, the agrarian system appears homogeneous.

The Hauts-Bassins ORD took a major step by developing a means of collecting data at the production-unit level. My colleagues and I assisted in finding practical ways to use the data. We are also seeking a better understanding of actual cotton-growing conditions by, among other things, attempting to establish a production-unit typology.

We selected 26 indicators for this typology. By using computerized data analysis, we were able to identify 8 different types of production unit (Table 1). We found a great deal of heterogeneity at the level that might be considered to concern the farmer most (Fig. 1), and for that matter, the region, which had been considered homogeneous, also proved geographically heterogeneous (Fig. 2).

Without having conducted extensive studies, we have amassed and analyzed information on a farming environment. Cooperation has been the key. Nevertheless, the investigation phase involved extensive analysis, and the primary concern was that the samples be representative. This lay the groundwork for the second phase — intensive analysis — which focused on

Table 1. Principal characteristics of 8 types of production unit in Hauts-Bassins ORD.

	Type							
Indicators/100 units	1	2	3	4	5	6	7	8
Population	640	609	772	645	1525	1133	863	1119
Working-age (>15 years) population	320	312	368	377	742	475	424	521
Draft animals	73	7	11	21	208	42	226	333
Plows	43	2	6	12	83	17	95	92
Cotton-treating machines	23	12	15	14	67	33	55	121
Cottonseed yield (kg/ha)	1933	1248	189	647	842	233	1113	1194
Use of animal traction (%)	27.6	10.0	3.0	12.4	43.5	7.2	57.5	62.7

case studies. To complete the picture, one needs chronological data to take into account the variability of the environment in terms of its two major components: ecology and economics.

Case studies

The principal aims of the methods involved in the case studies were to regard a farming system as a research station operating in real conditions to achieve a certain number of objectives with limited means, within constraints

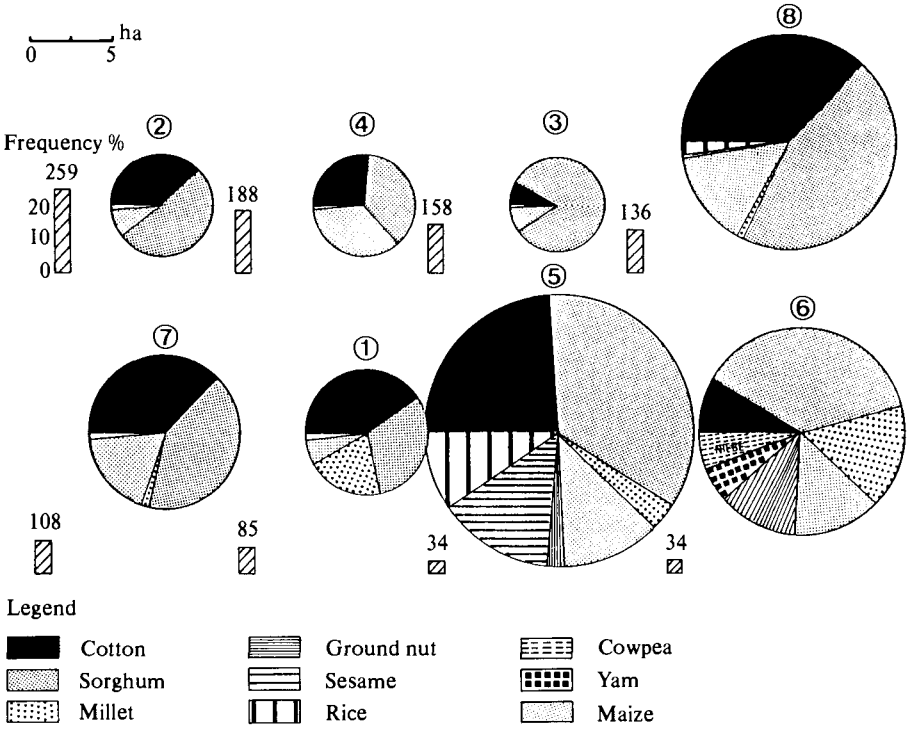

Fig. 1. Classification of the 8 farming-system types by decreasing order of importance, proportion of farm area, and 1981 crop rotation.

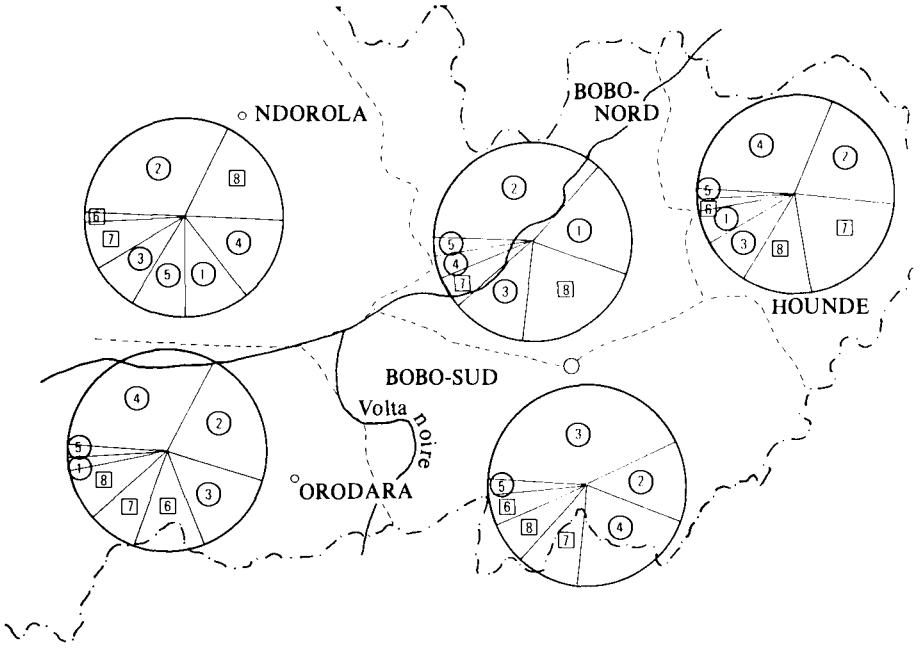

Fig. 2. Geographical distribution of production units by sector.

that are diverse and often unpredictable; to collect information in the most basic form to avoid biased interpretations and provide answers to the questions of who does what, when, where, how, and why (the last question probably being the most important because it involves causality and goes beyond description); to involve the farmers directly or indirectly in this activity and initiate dialogue based on the farmers' knowledge, their logic, our own logic as researchers, and, perhaps, the discoveries we will make together; and to use automated means, in particular microcomputers, to process in a reasonable time the large volumes of data collected.

We began by studying the selected production units' structures, available means, and production intentions. The data gathering required participation by the farmers or literate members of their family who were trained in the use of standardized vocabulary and notation concerning the activities to take place during the research. The standardization permitted computer processing of all data without coding, which causes delays and, at times, errors. The idea was to have the maximum amount of processed information available when required for the activity.

After two trials in the Central African Republic and Mali, the program was extended to Upper Volta as a test of the methods. Given the limited computer facilities available to the team in Upper Volta, I can report only a portion of the work under way on three farms in the ORD's Houndé sector. The farms have distinct structures: one uses manual labour, another uses animal traction, and the other has motorized equipment.

Data collected must always be perceived by researchers as a means to carry on dialogue with the farmers. For example, the data concerning labour

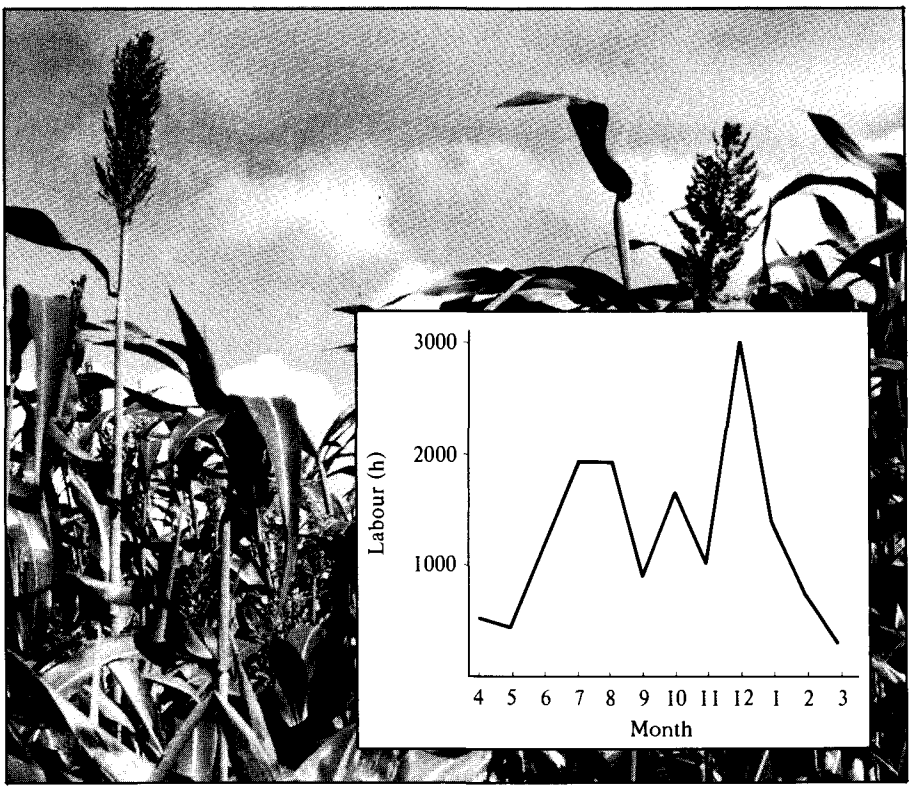

Fig. 3. Total labour use by month. Sorghum production, which is a component of all eight cropping systems, demands about 6% of the total, mainly for weeding and harvest.

(Fig. 3, Table 2) indicated clearly the relative dominance of maintenance and harvesting. How do the farmers perceive the dominance? What are the consequences? One can carry the analysis to the plot level — of cotton production, for example — still focusing on labour data. On one farm, six plots were cultivated during the crop year. The weeding time varied in a ratio of 1 : 8, indicating the great variation possible in one type of farming activity and for one crop. The variability is the product of real rather than

Table 2. Labour use (h) by crop, activity, and type[a] of worker.

	Cotton				Maize				Sorghum				Groundnut			
	M	W	C	O	M	W	C	O	M	W	C	O	M	W	C	O
Seed bed preparation	236	104	225	380	160	73	70	—	33	—	25	—	6	—	12	—
Seeding	71	67	94	—	40	33	13	—	17	35	3	—	10	61	10	—
Fertilization	33	52	24	—	16	42	60	—	—	—	—	—	—	—	—	—
Weeding, crop management	834	641	1029	—	205	102	402	—	79	—	279	—	20	18	27	—
Insecticide applications	69	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Harvest	786	769	559	1841	336	359	180	146	88	48	14	—	109	92	51	80

[a] Type of worker: M = man; W = woman; C = child; O = outsider.

experimental conditions and provides valuable answers about the system's environment. The reasons for the variability may be diverse and include such things as the previous crops grown on the plot, the type of soil, the preparation of the seed bed, rainfall, available technical resources, and social factors. Similarly, harvesting time is in a ratio of 1 : 5.

By extrapolating this type of observation to the entire agricultural operation, using the collected data, one can determine the technical agendas for each crop and each plot. This information allows one to ascertain the objectives, the farmers' means, and the diverse constraints. The dialogue should provide researchers with an understanding of the farmers' logic and the background necessary for both groups to work together: a joint researcher–farmer effort based on the information collected and aimed principally at identifying cause-and-effect relationships rather than describing the situation. This can produce a preliminary list of problems and, in some cases, solutions to the problems.

On-farm activity must be preceded by research or experimentation in a controlled environment. At each step, one should attempt as complete an evaluation as possible so as to increase the possibility of extending the results for development. No standard tool is relevant to all cases. For example, the introduction of a new variety differs substantially from the introduction of a herbicide. They have different impacts and risks.

The impact of a new variety is modest in relation to that of other production factors. For example, the two major effects for cotton are, first, variation in production of, perhaps, 10% and, second, variation in risk as determined by the hardiness of the new variety. These effects are more significant at the industrial level, from the ginning plant to the oil mill to the spinning mill, than at the farm level. A very simple approach is to introduce the new variety on a small strip 10 m wide and 100 m long, for example, located between two identical strips for comparison purposes. The quantity and quality of the yield are measured on all three strips for corresponding technological analyses, and the farmers' reactions to the new variety are recorded on a questionnaire. This type of innovation is of little concern to the farmer.

In the introduction of herbicide, the researchers' and farmers' concerns are much greater. There are technical aspects at the plot level, including heterogeneity within the plot, soil preparation, the skills involved in herbicide application, modifications of treatments with corresponding side-effects, effects on succeeding crops. Other considerations are inputs available in the system (applicator and product); reliability and organization of supply; as well as economic factors such as cost of equipment and product, equipment operating costs, and labour requirements. Also, the herbicide must be applied on a scale large enough to ensure that observations are not skewed, especially concerning work time. The usual proposal is to divide the farmer's plot into three equal parts and introduce the innovation on the middle section.

Conclusions

The activities I have described are part of a process involving all levels of agricultural systems, from the national to the individual. The extent to which

the various partners and research disciplines are involved depends on the level concerned as well as the research stage. The common denominator for everyone must be the farmer.

If this condition is met, one can focus on the diverse data that are needed to reinforce the frame of reference and ensure it is both representative and consistent. However, the rural environment is profoundly variable. This means that basic changes in working methods are required. Most importantly, models, which are based on too few variables and are much too prescriptive, should be abandoned. A good initial instrument, in my opinion, is a typology that identifies the most pertinent criteria for directing development proposals. This approach has increased the likelihood that IRCT will be able to respond to farmers' real problems and limits the risks involved in extending solutions.

This paper was prepared with the help of Célestine Belem and Michel Berger (IRCT, Upper Volta), Alain Joly (IRCT, Montpellier, Biometrics), and Yeko Traore and Pierre Cochelin (Hauts-Bassins ORD).