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FARMER FIRST
*Farmer Innovation
and Agricultural Research*

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something more than understanding is required. Researchers also need to be clear in their own minds about whether they aim to legitimize local knowledge solely in the eyes of the scientific community, by picking out the 'tit-bits' of practical information, or whether they are trying to strengthen and maintain its cultural integrity. Juma (1987b) has argued that indigenous knowledge could be 'delegitimized' in the eyes of local people, or reduced to trivia, if isolated from its cultural context and forced into the framework of western epistemology. Thrupp (1987) similarly argues that simply to collect the technically useful items of local knowledge in 'scientized packages' will tend to devalue it.

Legitimizing local knowledge may be important in maintaining a people's sense of values and in opposing cultural threats from outside, but to achieve that necessary recognition by discarding aspects of knowledge which refer, through symbolism, to social values, is self-defeating and contradictory. For example, in parts of Kenya, pastoralists have their own system of range management based on extensive indigenous ecological and *social* knowledge. If the pastoralists are to retain their identity and lifestyle, they must make their range management knowledge seem rational and legitimate to the government, but it is difficult to do this without sacrificing the social and cultural content of the knowledge which is a large part of what makes it effective.

The problem is seen in its starkest terms in the context of indigenous medical practice. Physical illness always has social and psychological implications and the symbolism and ritual associated with much traditional medicine in Africa provides a means of coping with them. Traditional medicine is now achieving some recognition, partly by adopting professional organizations and partly with the support of authorities unable to reach all their people with conventional medical services. But according to Last and Chavunduka (1988:267):

there is an inherent danger that traditional medical knowledge will be defined simply in terms of its technical herbal expertise, that this experience will in turn be recognized only for its empirical pharmacognosy, without reference to the symbolic and ritual matrix within which it is used – still less the social matrix in which those rituals and symbols have meaning.

The risks encountered in farming are neither so personal as in illness, nor usually so threatening, so the ritual content of agricultural knowledge and technique is usually less than in medicine. Even so, there is often a ritual content for reasons which the next section attempts to explain.

1.6 Agriculture as a performance

PAUL RICHARDS

Is R&D directed at the wrong target?

In the rice-growing zone of West Africa, much agricultural research effort since the 1930s has gone into varietal selection. Release and spread of improved varieties has been a key component in a number of subsequent 'green revolution'-type initiatives. Improved dryland rice varieties outyield local varieties by about 10 to 30 per cent in typical on-farm conditions.

The major constraint determining success or failure in the Mende village in Sierra Leone where I worked in 1982–3 was timely access to labour – especially access to cooperative labour groups during the rice-planting season. To secure a labour group at the right moment it is necessary both to command a range of social skills (to know how to 'beg' the convenors) and to be in a position to offer the group the right food and other perquisites.

Labour groups will down tools if the food is not up to standard. They must be offered rice. There must be fish or meat and sufficient salt in the stew. Alcohol, cigarettes and cola are additional inducements. The business of putting together an agricultural work party is not unlike the business of organizing a dance, the other kind of party which enlivens Mende village life. The parallel is especially close where labour groups work to musical accompaniment.

Agricultural researchers spend much time measuring rice yields, but there are few measurements relating to the significance of music in agricultural production. What is the impact of drumming on agricultural labour? In one case where I undertook measurements of the same group working on the same day with and without music, 20 per cent more work was done to drumming than without it. I find this figure intriguing. It relates to what I would term a performance factor and is but one among many instances in peasant farming in Africa where the difference between getting a performance factor right and wrong is of the same order of magnitude as the productivity increment to be had from adopting research recommendations.

By and large, agricultural research has so far ignored performance as an area for systematic enquiry. This is not for want of material. Much of social theory is a theory of performance. The ethnographic literature contains many relevant examples, not least concerning the connection between music and work, or brewing and the organization of work parties. The significance of this material, however, seems to have eluded agriculturalists working on small-farmer farming systems.

The meaning of 'performance' in this context can be illustrated by an example which also shows how distant normal agricultural research is from performance thinking. The example comes from a discussion by Michael Watts (1983) concerning the way Hausa farmers in a village in Katsina,

northern Nigeria, compensate for the effects of poor rainfall. What he observed was that the farmers make a series of rolling adjustments to drought. If the rains are late or stop unexpectedly, the first planting of sorghum may fail. The existing farm is replanted as many times as is necessary or until the farmer no longer has any seed left. At each replanting a different seed mix may be tried, better to fit available resources to changing circumstances. As the need arises and resources permit the farmer may then hedge or criss-cross the main plot with various back-up and insurance crops.

Farming systems researchers might imagine themselves to be on familiar ground at this point. They would tend (so Watts argues) to treat each of these resulting cropping patterns as a pre-determined design, as if in effect each farmer had said, 'this year to minimize the risk of drought I will plant so much sorghum, so much millet, so much cassava', etc.

This is to misunderstand almost entirely what has happened. The crop mix – the layout of different crops in the field – is not a design but a result, a completed performance. What transpired in that performance and why can only be interpreted by reconstructing the sequence of events in time. Each mixture is an historical record of what happened to a specific farmer on a specific piece of land in a specific year, not an attempt to implement a general theory of inter-species ecological complementarity (as plant ecologists might suppose).

Researchers, then, are looking at the wrong problem. They are looking for the combinatorial logic in intercropping where what matters to the Hausa farmer is sequential adjustment to unpredictable conditions. It is important therefore not to confuse spatial with temporal logic – not to conflate plan and performance.

But conventional agricultural research is not good at coping with performance issues for basic methodological reasons. Trials and experiments are 'out of time'. This is the basis for replication and comparison. By contrast the issues at stake in performance only become apparent when the performance is for real.

Thinking about performance

If conventional agricultural R&D has so far failed to take on performance issues, where might we look for models and inspiration? Musical performance is not a bad starting point, not only because music is integral to agricultural performance in many societies, but because it provides some useful questions about the link between analyst and performer.

A useful parallel can be drawn between musical analysts (critics and scholars) in 'western' concert music and agricultural scientists. Both are high status intellectuals concerned to understand how their subject matter works. The analogy breaks down (in a useful and thought-provoking way) when we factor in the performer. Concert artists are at least the equal of musical analysts in power and social standing. The connection between 'research' and 'performance' is open to negotiation between equals: some performers find analysis helpful and interesting, others are

openly sceptical about what musicology contributes to their success as performers.

Agricultural research for resource-poor farmers is different. Here the performers are all of low status and little influence. They too may be sceptical of whether research helps, but they have little scope for voicing this scepticism. In this case, analysts are powerful individuals whose confidence that performers would perform better if they hearkened to analytical advice brooks no argument.

Chambers (1983) has addressed this asymmetry between analysts and performers in tropical agriculture and has suggested dealing with it by a series of conscious inversions and role-reversals – trying to get researchers to assume the farmer's standpoint. One way to do this might be to impose 'real life' constraints on the running of experiments and trials. This, I take it, is one of the factors in recent enthusiasm for on-farm trials and with-farmer research programmes. Trying to run a farm with the resources available to the typical peasant farmer is certainly a salutary experience. I would argue, however, that such initiatives will remain unrealistic from the performance point of view because they are powerless to grasp the way in which farming operations are embedded in a social context and therefore miss the contingencies generated by that context (reasons of the 'last week we had to sell the cow to pay for granny's funeral' kind).

This is something with which musical performers are familiar. They study, analyse, practice not to make mistakes. They plan ahead how to phrase a melody, coordinate entrances, pace the various sections of a piece, but much of this planning may go awry on the night. Faced with the realities of an audience it suddenly seems different. A good musician needs other skills, therefore – how to overcome nerves, how not to panic, how to recover from mistakes. No one, however talented, plays perfectly all the time. The capacity to keep going and avoid complete breakdown is always an important musical skill, however hard to define or teach.

It may be of interest, therefore, to agriculturalists to pay systematic attention to the coping skills of concert performers. An initial survey suggests the range of strategies is unusually wide. Some are based on common sense and experience. Others depend on medication or advice from psychologists. Then there are those based on 'indigenous' theories developed by performers themselves. Much in the last category will appear to outsiders to be pseudo-scientific mumbo-jumbo. But to the performer grappling with nerves and stage fright, scientific respectability is of little significance. It only matters that it works.

This helps, I think, put much 'indigenous technical knowledge' in the agricultural field into a new and useful context. Much of it should be judged and valued not by the standards of scientific analysis, but as self-help therapy through which farmers put their mistakes and disasters behind them without the performance grinding to a halt. But to treat ITK as a patch and mend philosophy in this way is not to devalue it. The problem is that science (infatuated with endless vistas of new research funding?) totally underestimates the capacity to keep going under difficulties. In the appalling environmental and economic conditions faced by many poor

Why not
focus
improvement
here?

farmers in the tropics even to reproduce the status quo is often a brilliantly innovative achievement.

Perhaps the gap between farmers and researchers could be closed if those on the formal side of the fence reflected upon one lesson in particular from the musical field. Technical perfection is no guarantee that an audience will be moved. Conversely, technically imperfect performances are sometimes great performances. The composer Gustav Holst (reflecting upon musical performances by amateurs) used to say that 'if a thing is worth doing at all it is worth doing badly'. This comes close to the essence of what it is about performance that so frequently eludes 'normal science'.

Implications for research methods

How might agriculturalists begin to understand agriculture as social action and determine new (though inevitably more modest) targets for assistance to agricultural activities inextricably bound up in larger social processes?

One answer is that so-called ethnographic methods will assume much greater prominence in agricultural research than hitherto. Ethnographic methods (notably participant observation) allow some access to and understanding of performance issues in agriculture. The approach is not new. It was notably pioneered by de Schlippe (1956), an agronomist who retrained as an anthropologist and wrote what is still one of the best books on performance in African agriculture. One of his great achievements was to show that aspects of life totally alien to agriculture in a scientist's eyes are eminently explicable when seen in performance terms. One example is the relevance of witchcraft beliefs in the process of screwing up the performer's nerves to 'concert pitch' (or alternatively, undermining the confidence of rivals, perhaps deterring thieves from raiding isolated farm encampments during lengthy dry-season absences on hunting expeditions).

The attention paid to participants' own theories of performance is a central feature of the ethnography of performance. Again, some of the best material concerns music, notably in Ruth Stone's (1982) book on the organization of the musical event among the Kpelle of Liberia. She pays particular attention to the way in which sponsors of musical events, musicians and audiences, negotiate a performance and then how they understand the business of performing well. This introduces the reader to a range of performance skills, as understood by the Kpelle – timing, turn-taking, how to begin and end, how to cue, entrances and exits, how to cope with mistakes and broader notions of harmony, togetherness and the social and spiritual auspices under which music takes place.

Stone's study is especially interesting when read alongside the work of Bellman (1984) on the social uses of secrecy in Kpelle society. Bellman, working within the ethnomethodological tradition, is concerned with the way the Kpelle use ideas about ritual secrecy to segregate and demarcate distinct discourses. The ability to speak in Kpelle is far from being simply a question of possessing relevant knowledge. 'Speaking' is having a licence to perform. Such licences are gained through membership of appropriate closed associations ('secret societies').

This is a useful and immediate corrective to any naive view of the possibilities for interaction between farmers and agricultural scientists, or to simple belief in the capacity of such dialogue to achieve generally beneficial results. Researchers would first have to examine the auspices under which any participatory debate took place and how those auspices were interpreted both by participants and bystanders. Since it is not obvious without careful prior empirical investigation that Kpelle notions on these points would in any way coincide with those of agricultural researchers, the possibilities for cultural mis-communication must be enormous.

Thus accounts of agricultural performance informed by critical insights of the kind deployed by Stone and Bellman are badly needed in agricultural research. As my material at the outset suggests one place to start would be the process of labour negotiation. Another is how 'household farming units' are put together. 'Farm households' are not fixed in social structure. To a large extent they are the result of specific social negotiations (eg, marriage transactions). In some cases, they are negotiated and renegotiated on an annual basis. This brings into question the tendency among agricultural economists and farming systems researchers to treat the 'farm household' as a unit.

Another obvious area for further work is performance under duress. Coping skills in agriculture are often especially difficult to pin down systematically and describe, but there have been good beginnings in the work of Michael Watts (1983) on coping with drought and Barbara Harrell-Bond (1986) on refugee resettlement. This last study is especially important for demonstrating the extent to which refugee survival is skilled social achievement. By describing the contrast in fortunes of self-settled refugees and those in camps run by agencies, Harrell-Bond demonstrates the need above all to sustain those senses of vision and purpose through which social groups retain their capacity to act in a creative and cohesive manner.

Scientists and farmers

References and sources

An asterisk (*) indicates a paper presented at the IDS Workshop on Farmers and Agricultural Research: Complementary Methods, held at the Institute of Development Studies, University of Sussex, UK 26–31 July 1987. Only the short title of such papers is given, together with a reference to any published version. Where papers have not been formally published, copies can be obtained from: Institute of Development Studies, University of Sussex, Brighton, BN1 9RE, England, or from Overseas Development Institute, Regent's College, Inner Circle, Regent's Park, London, NW1 4NS

- Abedin, MZ, 1982, 'Proceedings of the workshop on experience gained by progressive farmers in potato cultivation in Rangpur District', E&R Project, Bangladesh Agricultural Research Institute, Ishurdi, Bangladesh
- *Abedin, MZ, and Haque, MF, 1987, 'Learning from farmer innovations and innovator workshops', IDS Workshop. For shortened version, see section 3.5 above
- African Development and Economic Consultants (ADEC), 1983, Agroforestry systems evaluation survey, ADEC, Nairobi
- Aguila, F Jr, 1982, 'Social forestry for upland development: lessons from four case studies', Institute of Philippine Culture
- Alao, J, 1980, 'Understanding small farmer adoption behaviour: the Nigerian experience', in *Agurta Lecture Series*, 44, University of Ife Press, Ife-Ife, Nigeria
- Altieri, MA, 1983, 'Agroecology: the scientific basis of alternative agriculture', Division of Biological Control, University of California, Berkeley, CA
- Amir, P, and Knipscheer, HC, 1987, 'Application of the environment-behaviour-performance model in farming systems research', *Agricultural Administration and Extension*, 25, pp 161–176
- Ashby, JA, 1986, 'Methodology for the participation of small farmers in the design of on-farm trials', *Agricultural Administration and Extension*, 22, pp 1–19
- Ashby, JA, 1987, 'The effects of different types of farmer participation on the management of on-farm trials', *Agricultural Administration and Extension*, 24, pp 235–252
- *Ashby, JA, Quiros, CA, and Rivera, YM, 1987, 'Farmer participation in on-farm varietal trials', IDS Workshop. For shortened version, see sections 3.2 and 3.4 above. Available as ODI *Agricultural Administration (Research and Extension) Network Discussion Paper 22*, December 1987
- Atta-Krah, AN, and Francis PA, 1987, 'The role of on-farm trials in the evaluation of composite technologies: alley farming in Southern Nigeria', *Agricultural Systems*, 23, pp 133–152
- *Baker, G, Knipscheer, HC, Neto, Jose de Souza, 1988, 'The impact of regular research field hearings in on-farm trials in northeast Brazil', *Experimental Agriculture* Vol 4, part 3, pp 281–288
- Bari, F, 1974, 'An innovator in a traditional environment', Bangladesh Academy for Rural Development, Kotbari, Comilla, Bangladesh, 55 pp.
- Barrow, EGC, 1985, 'An analysis of human and environmental factors in the agricultural development of East Pokot', Nginyang Division, Baringo District, Kenya. Master's thesis, Antioch University, USA
- *Barrow, EGC, 1987, 'Extension and learning examples from the Pokot and Turkana', IDS Workshop
- Basant, R, 1988, 'The diffusion of agro-mechanical technology for Indian rainfed farming: an exploratory analysis', *Agricultural Administration (Research and Extension) Networking Paper 24* ODI, London
- Bellman, BL, 1984, *The Language of Secrecy: symbols and metaphors in Poro Ritual*, New Brunswick: Rutgers University Press
- Biggs, SD, 1978, 'On-farm and village level research: an approach to the development of agricultural and rural technologies', in *Economic Problems in Transfer of Agricultural Technology. Proceedings of a National Seminar*, Indian Agricultural Research Institute, New Delhi
- Biggs, SD, 1979, 'Timely analysis in programmes to generate agricultural technologies', in Conference on Rapid Rural Appraisal, Institute of Development Studies, University of Sussex, Brighton
- Biggs, SD, 1980, 'Informal R and D', *Ceres*, 13(4), pp 23–6
- Biggs, SD, 1981, 'Sources of innovation in agricultural technology', *World Development*, Vol 9, no 4, pp 321–336
- Biggs, SD, 1983, 'Institutions and decision-making in agricultural research', in *The Economics of New Technology in Developing Countries*, Frances Pinter, London
- Biggs, SD, 1987, 'Interactions between resource-poor farmers and scientists in agricultural research', School of Development Studies, University of East Anglia, Discussion Paper for OFCOR research group; ISNAR study on Organization and Management of On-farm Research
- Biggs, SD, 1988, *Resource-poor Farmer Participation in Research: a synthesis of experiences from nine national agricultural research systems*, ISNAR, The Hague
- Biggs, SD, and Farrington, J, 1989, 'Social science analysis in agricultural research: a review and conceptual framework', IDRC, Ottawa
- Box, L, 1982, 'Food, feed or fuel? Agricultural development alternatives and the case for technological innovation in cassava cultivation', *Quarterly Journal of International Agriculture*, Special Issue: 34–48
- *Box, L, 1987a, 'Experimenting cultivators', IDS Workshop. For shortened version, see section 2.2 above. Available in full as 'Experimenting cultivators: a methodology for adaptive agricultural research', ODI Agricultural Administration (Research and Extension) Network *Discussion Paper 23*, December 1987
- Box, L, 1987b, 'Knowledge, networks and cultivators: cassava in the Dominican Republic', International Course for Rural Extension, Wageningen
- Box, L, and Doorman, FJ, 1985, 'The adaptive farmer: sociological contributions to adaptive agricultural research on cassava and rice cultivation in the Dominican Republic', Department of Rural Sociology of the Tropics and Sub-tropics, Agricultural University, Wageningen
- Braidwood, RJ, 1967, *Prehistoric Men*, Scott, Foresman and Co, Glenview, Illinois
- Brammer, H, 1980, 'Some innovations don't wait for experts: a report on applied research by Bangladesh peasants', *Ceres*, 13 (2), pp 24–28
- Brammer, H, 1982, 'Crop intensification: why and how lessons from peasants in Bangladesh', *Ceres*, 15(3), pp 43–45
- Brokensha, D, Warren, D, and Werner, O, (eds.) 1980, *Indigenous Knowledge Systems and Development*, University Press of America, Lanham, Maryland
- Buck, L, 1988, *Agroforestry Extension Training Source Book*, CARE International, New York, 540 pp
- Bunch, R, 1985, *Two Ears of Corn: a guide to people-centered agricultural improvement*, World Neighbors, 5116 North Portland, Oklahoma City, Oklahoma 73112
- *Bunch, R, 1987, 'Small farmer research', IDS Workshop. For shortened version, see section 2.1 above
- Byerlee, DK, and Collinson, MP, 1980, *Planning Technologies Appropriate to Farmers: concepts and procedures*, CIMMYT, Mexico
- Caldwell, JS, and Lightfoot, C, 1987, 'A network for methods of farmer-led systems experimentation', *FSSP Newsletter*, 5(4): pp 18–24
- Carlier, 1987, *Understanding Traditional Agriculture: Bibliography for Development Workers*, ILEIA, Leusden, The Netherlands

Carson, B, 1987, 'Appraisal of rural resources using aerial photography: an example from a remote hill region in Nepal', in KCU 1987, *Proceedings of the 1985 Conference on Rapid Rural Appraisal*, pp 174-190

Casley, D, and Kumar, K, 1987, *Project Monitoring and Evaluation in Agriculture*, The Johns Hopkins University Press

Chambers, R, 1983, *Rural Development: putting the last first*, Longman, Harlow

Chambers, R, 1988, 'Direct Matrix Ranking in Kenya and West Bengal', *RRA Notes 1*, IIED, London, pp 13-18

Chambers, R, forthcoming, 'Farmer-first: a practical paradigm for the third agriculture'. In M Altieri and S Hecht (eds) *Agroecology and Small Farm Development*, CRC Press, Florida

Chambers, R, and Ghildyal, BP, 1985, 'Agricultural research for resource-poor farmers: the farmer-first-and-last model', *Agricultural Administration and Extension*, 20, pp 1-30

Chambers, R, and Jiggins, J, 1986, 'Agricultural Research for resource-poor farmers: a parsimonious paradigm', *Discussion Paper 220*, IDS, University of Sussex

Chambers, R, and Longhurst, R, 1986, 'Trees, seasons and the poor', *IDS Bulletin*, 17 (3)

Chambers, R, and Leach, M, 1987, 'Trees to meet contingencies: savings and security for the rural poor', *Discussion Paper 228*, Institute of Development Studies, University of Sussex, 22 pp

Chapman, B, 1984, Diet and production survey memoranda 1, 2, 3, Tropsoils Research Report, Sitiung, Indonesia

*Charoenwatana, T, 1987, 'Farmers and agricultural science', IDS Workshop

Chavangi, NA, 1988, 'Problem definition and a statement on the case for an expanded awareness programme in Kakamega district', Kenya Woodfuel Development Project

*Chavangi, N, and Ngugi, A, 1987, 'Innovatory participation in programme design: tree-planting for increased fuelwood supply for rural households in Kenya', IDS Workshop

*Chaves, LE, 1987, 'Some experiences of farmers' participation in Colombia', IDS Workshop

Colfer, CJP, 1983, 'On communication among "unequals"', *International Journal of Intercultural Communication*, 7, pp 263-283

*Colfer, CJP, 1987a, 'Intra-team collaboration in the Tropsoils project', IDS Workshop

*Colfer, CJP, 1987b, 'On farmer-researcher interaction', IDS Workshop

*Colfer, CJP, 1987c, 'Farmer involvement in the Tropsoils project: two complementary approaches', IDS Workshop. See section 3.8 for a shortened version

*Colfer, CJP, 1987d, 'How to ascertain which crops are grown', IDS Workshop

*Colfer, CJP, Evensen, C, Evensen, S, Fahmuddin Agus, D, Gill, D, Wade, A and Chapman, B, 1985, '"Transmigrants" gardens: a neglected research opportunity', Proceedings, Centre for Soil Research, Annual Technical Meetings, Bogor, Indonesia

*Colfer, CJP, Gill, D, and Fahmuddin Agus, D, *Indigenous Agricultural Models: a source of scientific insight*, forthcoming

Collinson, MP, 1981, 'A low-cost approach to understanding small farmers', *Agricultural Administration and Extension*, 8, pp 433-50

Collinson, MP, 1982, 'Farming systems research in Eastern Africa the experience of CIMMYT and some national agricultural research services, 1976-81', *International Development Paper No. 3*, Michigan State University, East Lansing

Collinson, MP, 1987, 'Farming systems research: procedures for technology development', *Experimental Agriculture*, Vol 23, pp 365-86

Collinson, MP, 1988, 'The development of African farming systems: some personal views', *Agricultural Administration and Extension*, Vol 29, No 1, pp 7-22

Conroy, C, and Litvinoff, M, eds, 1988, *The Greening of Aid: Sustainable Livelihoods in Practice*, Earthscan Publications, London

Conway, GR, 1985, 'Agroecosystem Analysis', *Agricultural Administration*, Vol 20, pp 31-55

Conway, GR, 1986, 'Agroecosystem analysis for research and development', Winrock International, Bangkok

Conway, GR, 1987a, 'The properties of agroecosystems', *Agricultural Systems*, 24, pp 95-117

*Conway, GR, 1987b, 'Diagrams for farmers', IDS Workshop. For shortened version, see section 2.5 above

Conway, GR, and Sajise, PE, 1986, 'The agroecosystems of Buhi', Programme on Environmental Science and Management, University of Philippines, Los Banos

Conway, GR, McCracken, JA, and Pretty, JN, 1987, *Training Notes for Agroecosystem Analysis and Rapid Rural Appraisal*, second edition, Sustainable Agriculture Programme, International Institute for Environment and Development, London

De Jager, A, 1988, 'Towards self-experimenting village groups', paper for workshop on Operational Approaches for Participative Technology in Sustainable Agriculture, ILEIA, Leusden, 11-12 April 1988

Dharampal, 1971, *Indian Science and Technology in the Eighteenth Century*, Impex India, Delhi

*Edwards, RJA, 1987a, 'Farmers' knowledge: utilization of farmers' soil and land classification', IDS Workshop

*Edwards, RJA, 1987b, 'Farmers' groups and panels', IDS Workshop

*Edwards, RJA, 1987c, 'Mapping and informal experimentation by farmers: agronomic monitoring of farmers' cropping systems', IDS Workshop

*Eklund, P, 1987, 'Low-cost diagnostic methods for low-input strategies in sub-Saharan Africa', IDS Workshop

ERC, 1988, *Rapid Rural Appraisal: a closer look at rural life in Wollo*, Ethiopian Red Cross Society, Addis Ababa and the International Institute for Environment and Development, London

Evensen, C, Yost, R, and Wade, M, 1985, 'Source and management of green manure - preliminary uniformity trial', *Field Research Brief No. 16*, Tropsoils Project, Sitiung, Indonesia

Ewell, P, 1988, *Organisation and Management of Field Activities in On-Farm Research: a Review of Experience in Nine Countries*, OFCOR Comparative Study No 2, International Service for Agricultural Research, The Hague, Netherlands, September

Fahmuddin Agus, D, Wade, MK and Prawirasumantri, J, 1985, 'Effects of post-clearing methods on soil properties and crop production', *Field Research Brief Nos. 7, 18 and 25*, Tropsoils Project, Sitiung, West Sumatra, Indonesia

Farrington, J, 1988, (ed), *Experimental Agriculture*, Vol 24, part 3, with 'Farmer Participatory Research: Editorial Introduction', pp 269-279

Farrington, J, 1989, 'Farmer participation in agricultural research', *Food Policy*, Vol 14, No 2

Farrington, J and Martin, A, 1988, 'Farmer Participation in Agricultural Research: a review of concepts and practices', *Agricultural Administration Occasional Paper No 9*, ODI, London

Feldstein, H, Poats, S, and Rocheleau, D, 1987, 'Intra-household analysis and on-farm research and experimentation'. Paper presented at the CIMMYT Workshop on Intra-Household Dynamics and Farming Systems Research, Lusaka, Zambia, 25-30 April

Feldstein, H, and Jiggins, J, forthcoming, *Methodologies Handbook: Intra-household Dynamics and Farming Systems Research and Extension*, Population Council, New York

Fernandez, ME, 1988, 'Towards a participatory approach: new demands on researchers and research methodologies', *ILEIA Newsletter* Vol 4, No 3, pp 15-17

*Fernandez, ME and Salvatierra, H, 1987, 'Design and implementation of participatory technology validation in highland communities of Peru'. See section 3.7 for a shortened version of this paper; see also Farming Systems Research Symposium, Kansas State University, Manhattan, Kansas, 5-8 October 1986

Flint, M, 1986, 'IFPP Farm Management Survey', mimeo, Botswana

Floquet, A, 1989, 'Conservation of soil fertility by peasant farmers in Atlantic Province, Benin', in J Kotschi (ed) *Ecofarming Practices for Tropical Smallholdings – Research and Development in Technical Cooperation*, GTZ, Eschborn

Fresco, LO, 1986, 'Cassava in shifting cultivation: a systems approach to agricultural technology development in Africa', Royal Tropical Institute, Amsterdam

Freudenberger, C Dean, 1988, 'The agricultural agenda for the Twenty First Century', *Kidma*, Israel Journal of Development, No 38, Vol 10, No 2, pp 32–36

Friesen, G, et al, 1982, 'Decade of dryland research in India', All India Coordinated Research Project for Dryland Agriculture, Santoshnagar, Hyderabad 500659, India

FSRDD, 1986, 'Naldung Farming Systems Site "Samuhik Bhraman"', *Report No. 5*, Ministry of Agriculture, FSRD Division, Khumaltar, Nepal

FSRDD, 1987, 'Kotjahari Samuhik Bhraman and Proposed Research Program', *Report No. 7*, Department of Agriculture, FSRD Division, Khumaltar, Nepal

Fujisaka, S, 1988a, 'Farmer participation in upland soil conservation research and technology dissemination in the Philippines', Agricultural Economics Department, IRRI, Manila, Philippines

Fujisaka, S, 1988b, 'A method for farmer-participatory research and technology transfer: upland soil conservation in the Philippines', Agricultural Economics Department, IRRI, Manila, Philippines

Fussell, GE, 1965, *Farming Techniques from Prehistoric to Modern Times*, Pergamon Press, Oxford, UK

*Galt, D, 1987, 'Informal observations on institutionalizing FSR in Nepal', IDS Workshop

Ganapin, D, 1979, 'Factors of underdevelopment in Kaingin communities', College of Forestry, University of Philippines, Los Banos

Getahun, A, Ndungu, J, Kadir, R and Bashir, J, 1986, 'Agroforestry experimental designs used by Kenya Renewable Energy Development Project', Ministry of Energy and Regional Development, Nairobi

*Ghildyal, BP, 1987, 'Drought-prone rice environment', 'Farmers' evaluation of rice-breeding materials', 'Appropriate technology and farmer-to-farmer extension in East India' (three short notes), IDS Workshop

Giddens, A, 1979, *Central Problems in Social Theory*, Macmillan, Basingstoke, UK

Gilbert, EH, Norman, DW, and Winch, FE, 1980, *Farming Systems Research: a critical appraisal*, MSU Rural Development Paper No 6, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan 48824

Gill, D, Kasno, A, and Adiningsih, JS, 1985, 'Response of Soybeans/Upland Rice and Soil K levels to K Fertilization and Green Manure Applications at Sitiung', *Field Research Briefs, Nos 8 and 13*, Tropsoils Project, Sitiung, West Sumatra, Indonesia

Gomez, K, 1977, 'On-farm assessment of yield constraints: methodological problems', in *Constraints to high yields on rice farms: an intensive report*, IRRI, Philippines

Goodell, G, 1982, 'Communication from farmer to scientist', (unpublished ms cited by Rhoades, 1987)

Grandstaff, SW and Grandstaff, TB, 1987, 'Semi-structured interviewing by multi-disciplinary teams in RRA', in KKKU 1987, *Proceedings of the 1985 Conference on Rapid Rural Appraisal*, pp 129–143

Grigg, D, 1982, *The Dynamics of Agricultural Change: the historical experience*, Hutchinson, London

Groosman, A, 1986, 'Technology development and the improved seed industry in North-South perspective', Development Research Institute, Tilburg University, Netherlands

Gubbels, P, 1988, 'Peasant farmer agricultural self-development: the World Neighbors experience in West Africa', *ILEIA Newsletter*, Vol 4, No 3, pp 11–14

*Gupta, AK, 1987a 'Organizing the poor client responsive research system: can tail wag the dog?', IDS Workshop. See sections 1.4 and 2.6 above for extracts

*Gupta, AK, 1987b, 'Scientific perception of farmers' innovations', IDS Workshop. See section 1.4 above for extracts

Gupta, AK, 1987c, 'Technology for dry-farming: how the scientists, students and farmers view the challenge?' Indian Institute of Management, Ahmedabad

Gupta, AK, Patel, NT and Shah, RN, 1987, 'Matching farmers' objectives with technologists' objectives in dry farming regions', Centre for Management in Agriculture, Indian Institute of Management, Ahmedabad, mimeo

Haque, F, 1985, 'Proceedings of innovative farmers' workshop, 19–20 February, 1985', OFRD, Bangladesh Agricultural Research Institute, Jessore (mimeo, in Bangla)

Harrell-Bond B, 1986, *Imposing Aid: emergency assistance to refugees*, Oxford University Press, Oxford, New York, Nairobi

Hart, R, 1980, 'Agroecosistemas: conceptos basicos', CATIE, Turrialba, Costa Rica

Hart, R, 1986, 'Research and development strategies to improve integrated crop, livestock and tree systems'. Paper presented at the International Agricultural Research Centers (IARC) workshop on Farming Systems Research, ICRISAT, Hyderabad, India, 17–21 February

Harwood, RR, 1979, *Small Farm Development: understanding and improving farming systems in the humid tropics*, Westview Press, Boulder, Colorado

Hatch, JK, 1976, *The Corn Farmers of Motupe: a study of traditional farming practices in northern coastal Peru*, Land Tenure Centre, Monograph No 1, Madison, University of Wisconsin

Haverkort, B, and Engel, P, 1985, 'The systems approach, agricultural development and extension'. IAC, Knowledge systems in agricultural development, Manual Workshop III, International Course on rural extension, International Agricultural Centre, Wageningen, The Netherlands

Haverkort, B, 1987, 'Agricultural Development and Agricultural Knowledge. In an International Perspective', paper presented at the 35th International Course on Rural Extension, Wageningen, The Netherlands, 1987, pp 36

Haverkort, B, 1988, 'Agricultural Production Potentials: inherent, or result of investment in technology development? The influence of technology gaps on the assessment of production potentials in developing countries'. ETC Foundation, PO Box 64, 3830 AB Leusden, The Netherlands

Hendry, P, 1987, 'Research on farming systems offers new perspectives', *Ceres*, Vol 20, No 6, November–December, pp 13–15

Hildebrand, PE, 1979a, 'Initial characterization – the rapid survey or *Sondeo*', ICTA, Guatemala

Hildebrand, PE, 1979b, 'Summary of the *Sondeo* methodology used by ICTA', ICTA, Guatemala

Hildebrand, PE, 1981, 'Combining disciplines in rapid appraisal: the *Sondeo* approach', *Agricultural Administration*, 8, pp 423–432

Hildebrand, PE, 1982, 'Discussion of farming systems research: issues in research strategy and technology design', *American Journal of Agricultural Economics*, December 1982, pp 905–6

Hill, P, 1972, *Rural Hausa: a village and a setting*, Cambridge University Press, London

Hoek, A, van den, 1983, 'Landscape planning and design for a watershed in the Kathama Agroforestry Project, Kenya', MSc paper, Department of Landscape Architecture and Planning, Wageningen Agricultural University, Wageningen

Hope, A and Timmel, S, 1984, *Training for Transformation* (Books 1, 2, 3), Mambo Press, Zimbabwe

Horton, DE, 1984, *Social Scientists in Agricultural Research: Lessons from the Montaro Valley Project, Peru*, IDRC, Ottawa, 1984

Horton, D and Prain, D, 1987, 'CIP's experience with farmer participation in on-farm research', Proceedings, Taller para America Latina sobre Investigacion de Frijol en Campos de Agricultores, CIAT, Cali, Colombia, 16–25 February

*Hossain, SMA and Islam, MT, 1985, *A report on the first workshop of innovative rice farmers*, GTI Publication No 56, Bangladesh Agricultural University, Mymensingh

Hossain, SMA, Sattar, M, Ahmed, JV, Salim, M, Islam, MS and Salam, NV, 1987,

'Cropping Systems research and farmers' innovativeness in a farming community in Bangladesh', IDS Workshop

Howes, M and Chambers, R, 1979, 'Indigenous technical knowledge: analysis, implications and issues', *IDS Bulletin*, 10 (2), pp 5-11

Huxley, PA, and Wood, PJ, 1984, 'Technology and research considerations in ICRAF's diagnosis and design procedures', ICRAF, Nairobi

ICRAF, 1983a, 'Guidelines for agroforestry diagnosis and design', *ICRAF Working Paper No 6*, ICRAF, Nairobi

ICRAF, 1983b, 'Resources for agroforestry diagnosis and design', *ICRAF Working Paper No 7*, ICRAF, Nairobi

IDS, 1979, *IDS Bulletin*, 10 (2), 'Whose Knowledge Counts?'

ILEIA, 1988a, *Towards Sustainable Agriculture, Part One: Abstracts, Periodicals, Organizations, Part Two: Bibliography*, ILEIA Newsletter, May

ILEIA, 1988b, *Participative Technology Development*, ILEIA Newsletter Vol 4, No 3, October (also in French)

ILEIA, 1989, Proceedings of the ILEIA Workshop on Operational Approaches for Participatory Technology Development in Sustainable Agriculture, ILEIA, Leusden, Netherlands

ILO, 1981, *Zambia: Basic Needs in an Economy Under Pressure*, International Labour Office, Jobs and Skills Programme for Africa, Addis Ababa

ISNAR, 1986, 'The organizational and managerial implications of on-farm research: brief project statement', International Service for National Agricultural Research, The Hague

Jaiyebo, E and Moore, A, 1965, 'Soil fertility and nutrient storage in different soil-vegetation systems in a tropical rainforest environment', *Tropical Agriculture* (Trinidad), 41, pp 129-139

Jama, B, 1986, 'Alley cropping maize (*Zea mays*) and green gram (*Phaseolus aureus*) with *Leucaena leucocephala* as an alternative farming system at Mtwapa, Coast Province, Kenya', MSc thesis, University of Nairobi

*Jama, B, 1987, 'Learning from the farmer', *IDS Workshop*

Jiggins, J, 1988, 'Farmer participatory research and technology development', *Occasional Papers in Rural Extension, No 5*, Department of Rural Extension Studies, University of Guelph, Ontario, Canada

Jiggins, J, Engel, P, and Lightfoot, C, 1988, 'Matrices on different steps of participative technology development'. Workshop on Operational Approaches for Participative Technology Development in Sustainable Agriculture, ILEIA, Leusden, 11-12 April

Johnson, AW, 1972, 'Individuality and experimentation in traditional agriculture', *Human Ecology*, 1 (2), pp 448-459

Juma, C, 1987a 'Genetic resource and biotechnology in Kenya: towards long-term food security', Public Law Institute, Nairobi

*Juma, C, 1987b, 'Ecological complexity and agricultural innovation: the use of indigenous genetic resources in Bungoma, Kenya', IDS Workshop

Kabutha, C and Ford, R, 1988, 'Using RRA to formulate a village resources management plan, Mbusanyi, Kenya', *RRA Notes*, 2, IIED, London

Kang, BT, Wilson, GF and Sipkens, L, 1981, 'Alley cropping with maize (*Zea mays* L.) and leucaena (*Leucaena Leucocephala* LAM) in southern Nigeria', *Plant and Soil*, 63, pp 165-179

Kang, BT, Wilson, GF, and Lawson, TT, 1986, 'Alley cropping as a stable alternative to shifting cultivation', International Institute for Tropical Agriculture (IITA), Ibadan, Nigeria

*Kean, S, 1988, 'Developing a partnership between farmers and scientists: the example of Zambia's Adaptive Research Planning Team', *Experimental Agriculture*, Vol 24, part 3, pp 289-299

Kean, SA and Singogo, Lingston P, 1988, *Zambia: Organization and Management of the Adaptive Research Planning Team (ARPT)*, Research Branch, Ministry of Agriculture and Water Development, OFCOR Case Study No 1, ISNAR, The Netherlands, May

Kishewitsch, S, 1987, 'Agroforestry adaptation and adoption in Coast Province, Kenya', MSc Thesis, Faculty of Environmental Studies, York University, Toronto, Canada

KKU, 1987, *Proceedings of the 1985 International Conference on Rapid Rural Appraisal*, Rural Systems Research and Farming Systems Research Projects, Khon Kaen University, Khon Kaen, Thailand

Knipscheer, see Baker and Knipscheer

Knipscheer, HC and Kedi Suradisastra, 1986, 'Farmer Participation in Indonesian Livestock Farming Systems by Regular Research Field Hearings (RRFH)', *Agricultural Administration*, vol 22, pp 205-216

Korten, DC, 1980, 'Community organisation and rural development: a learning process approach', *Public Administration Review*, Vol 40, September-October pp 480-510

Korten, DC, 1984, 'Rural Development Programming: the learning process approach', in Korten, DC and Klaus, R (eds), *People-centered Development: contributions towards theory and planning frameworks*, Kumarian Press, West Hartford

Krishnamoorthy, CH, 1975, 'Pilot development project and operation research project', a mimeograph paper, All-India Coordinated Research Project for Dryland Agriculture, Santoshnagar, Hyderabad 500659, India

Kumar, K, 1987, *Conducting Group Interviews in Developing Countries*, AID Program Design and Evaluation Methodology Report No 8, USAID, Washington

Kuyper, JBH, 1987, 'On-farm agroforestry research in Kisii, Kenya', Beijer Institute, Nairobi

*Lamug, C, 1987, 'Interaction of upland farmers and scientists', IDS Workshop. See section 2.4 for a shortened version

Last, M and Chavunduka, GL (eds), 1986, *The Professionalisation of African Medicine*, Manchester University Press

Lightfoot, C, 1986, 'A short methodological account of a dynamic systems field experiment: the case of legume enriched fallows for the restoration of soil fertility, eradication of Imperata, improvement of pasture, and reduction in labour for cultivation, in the Philippines'. Draft paper for Farming Systems Symposium, Kansas State University, October 5-8, Farming Systems Development Project - Eastern Visayas, Ministry of Agriculture, Tacloban, Leyte, Philippines

Lightfoot, C, 1986, 'Conducting on farm research in FSR: making a good idea work'. Farming Systems Support Project, Gainesville, Florida

Lightfoot, C, 1987, 'Indigenous Research and on-farm Trials', *Agricultural Administration and Extension*, vol 24, pp 79-89

Lightfoot, C, de Guia, O Jr and Ocado, F, 1988, 'A participatory method for systems-problem research rehabilitating marginal uplands in the Philippines', *Experimental Agriculture* vol 24, part 3, pp 301-309

Lightfoot, C, Quero, F Jr and Villanueva, MR, 1985, *Review of research methods and findings, FSDP-EV Project Report No 33*, Department of Agriculture, Tacloban, Philippines

*Lightfoot, C, de Guia, O Jr, Aliman, A and Ocado, F, 1987, 'Letting farmers decide in on-farm research', IDS Workshop. See section 2.7 for a shortened version

Lindsay, RS and Hepper, F, 1978, *Medicinal Plants of the Marakwet*, London, Kew

Long, N, 1986, 'Creating space for change: a perspective on the sociology of development', Wageningen Agricultural University

Lundgren, B, 1982, 'Introduction', *Agroforestry Systems*, 1(1), pp 3-6

McCracken, JA, 1988, *Participatory Rapid Appraisal in Gujarat: a trial model for the Aga Khan Rural Support Programme (Kenya)*, International Institute for Environment and Development, London, November

McCracken, JA, Pretty, JN and Conway, G, 1988, *An Introduction to Rapid Rural Appraisal for Agricultural Development*, International Institute for Environment and Development, London

Makarim, AK and Cassel, DK, 1985, 'Tillage and soil amendments for land reclamation of a bulldozed area in Sitiung, West Sumatra', *Field Research Brief, No 4*, Tropsoils Project, Sitiung, Indonesia

- Malaret, L, and Nguru, FN, 1986, 'An ethno-ecological study of the interaction between termites and small-holder farmers in Kenya', abstract of paper presented at the International Conference on Tropical Entomology, 31 August-5 September, ICIPE, Nairobi
- Martin, A and Farrington, J, 1987, 'Abstracts of recent field experience with farmer participatory research', Agricultural Administration (Research and Extension) *Network Paper 22*, June, ODI, London
- Matlon, P, 1982, 'On-farm experimentation: ICRISAT farmers' tests in the context of a program of farm-level baseline studies', ICRISAT, Ouagadougou, Burkina Faso
- Matlon, P, 1985, 'A critical review of objectives, methods and progress to date in sorghum and millet improvement: a case study of ICRISAT/Burkina Faso'. In Ohm, HW and Nagy, J, (eds) *Appropriate Technologies for Farmers in Semi-arid West Africa*, Purdue University, West Lafayette, Indiana, pp 154-179
- Matlon, P, and Spencer, DS, 1984, 'Increasing food production in sub-Saharan Africa: environmental problems and inadequate technological solutions', *American Journal of Agricultural Economics*, Vol 66, No 5, pp 671-676
- Matlon, P, Cantrell, R, King, D and Benoit-Cattin, M, (eds), 1984, *Farmers' Participation in the Development of Technology: Coming Full Circle*, IDRC, Box 8500, Ottawa, 179 pp
- Mathema, SB and Van Der Veen, MG, 1978, 'Socio-economic research on farming systems in Nepal', *Cropping Systems Program, Technical Report 01*, Department of Agriculture, Khumaltar, Nepal
- Mathema, SB, Galt, DL, Krishna, KC, Shrestha, RB, Sharma, AR, Upraity, VN and Vaidya, NL, 1986, 'Group survey and on-farm trial process, Naldung Village Panchayat, SERED Report No 2, Ministry of Agriculture, Khumaltar, Nepal
- *Mathema, SB and Galt, D, 1987, 'The Samuhik Bhraman process in Nepal: a multidisciplinary group activity to approach farmers', IDS Workshop. See section 2.3 above for a shortened version
- *Maurya, DM and Bottrall, A, 1987, 'Innovative approach of farmers for raising their farm productivity', IDS Workshop. See section 1.2 for an extract. For a fuller version see Maurya, Bottrall and Farrington 1988
- Maurya, DM, Bottrall, A and Farrington, J, 1988, 'Improved livelihoods, genetic diversity and farmer participation: a strategy for rice-breeding in rainfed areas of India', *Experimental Agriculture*, vol 24, part 3, pp 311-320
- Maxwell, S, 1984, 'The social scientist in farming systems research', *IDS Discussion Paper 199*, Institute of Development Studies, University of Sussex, November
- Maxwell, S, 1986, 'Farming Systems Research: hitting a moving target', *World Development*, vol 14, no 1
- Menz, K, 1980, 'Unit farms and farming systems research: the IITA experience', *Agricultural Systems*, 6, pp 45-51
- Mercado, B, 1986, 'Control of *Imperata cylindrica*', in Moody, K. (ed), *Weed Control in Tropical Crops Volume 2*, SEARCA, Los Banos, Philippines, 293 pp
- Merrill-Sands, D, 1988, 'International Service for National Agricultural Research: Study on the Organization and Management of On-farm Client-oriented Research (OFCOR): Part I: Introduction', *ODI Discussion Paper 28*, Agricultural Administration (Research and Extension) Network, Overseas Development Institute, Regent's College, Regent's Park, London, May
- Mozans, HJ, 1983, *Woman in Science*, reprint of 1974, MIT Press, Cambridge, Massachusetts
- Munyao, PM, 1987, 'The importance of gathered food and medicinal plant species in Kakuyuni and Kathama areas of Machakos', Annex I in Wachira, KK (ed) *Women's Use of Off-farm and Boundary Lands: agroforestry potentials*, Final Report, ICRAF, Nairobi, pp 56-60
- Mutiso, RM, 1987, 'Survey of gathered wild foods and their nutritional value in Kathama', Annex I in Wachira, KK (ed) *Women's Use of Off-farm and Boundary Lands: agroforestry potentials*, Final Report, ICRAF, Nairobi, pp 114-123
- Muturi, SN, 1981, 'Agricultural research at the coast', a report of the National Council for Science and Technology, Nairobi, Kenya
- Nair, K, 1979, *In Defence of the Irrational Peasant: Indian Agriculture after the Green Revolution*, Chicago University Press
- Ngambeki, DS and Wilson, GF (undated), 'Economic and on-farm evaluation of alley cropping with *Leucaena leucocephala*', International Institute for Tropical Agriculture, Ibadan, Nigeria
- Norman, DW, 1974, 'Rationalizing mixed cropping under indigenous conditions: the example of northern Nigeria', *Journal of Development Studies*, 11, pp 3-21
- Norman, DW, 1980, 'Farming systems approach: relevance for the small farmer', *Rural Development Paper No 5*, Michigan State University, East Lansing
- Norman, DW, Simmons, EB and Hays, HM, 1982, *Farming Systems in the Nigerian Savanna: research and strategies for development*, Westview Press, Boulder, Colorado
- Norman, DW and Collinson, M, 1985, 'Farming systems approach to research in theory and practice', ACIAR Workshop on Farming Systems Research, Sydney, Australia, 12-15 May, 1985
- *Norman, DW, Baker, D, Heinrich, G, Jonas, G, Maskiara, S and Worman, F, 1987, 'Farmer groups for technology development: experiences from Botswana', IDS Workshop. For a shortened version of this paper see section 3.6. For a full version see Norman et al 1988
- Norman, D, Baker, D, Heinrich, G and Worman, F, 1988, 'Technology development and farmer groups: experiences from Botswana', *Experimental Agriculture*, Vol 24, part 3, pp 321-331
- Oakley, P, 1987, 'State or process, means or end? The concept of participation in rural development', *RRDC Bulletin*, Reading University, March, pp 3-9
- Odum, TO, 1983, *Systems Ecology: an introduction*, John Wiley & Sons, New York
- Oduol, PA, 1986, 'The shamba system: an indigenous system of food production from forest areas in Kenya', *Agroforestry Systems*, 4, pp 365-373
- Okafor, JC, 1981, 'Woody plants of nutritional importance in traditional farming systems of the Nigerian humid tropics', PhD thesis, Department of Resource Management, University of Ibadan
- Okali, C, 1983, *Cocoa and Kinship in Ghana: the matrilineal Akar of Ghana*, Routledge and Kegan Paul, London
- Okali, C and Milligan, K, 1982, article in 'The Role of Social Scientists in Developing Food Production Technology', IRRI, Manila, Philippines
- Okali, C and Knipscheer, H, 1985, 'Small ruminant production in mixed farming systems: case studies in research design', paper prepared for 5th Annual FSSP Research and Extension Symposium, Kansas State University
- Okali, C and Sumberg, JE, 1986a, 'Examining divergent strategies in farming systems research', *Agricultural Administration*, 22, pp 233-253
- Okali, C and Sumberg, JE, 1986b, 'Sheep and goats, men and women: household relations and small ruminant development in south-west Nigeria', *Agricultural Systems*, 18, pp 39-59
- Pacey, A and Cullis, A, 1986, *Rainwater Harvesting*, Intermediate Technology Publications, London
- Passerini, E, 1986, 'Food for everyone? Yes, from trees', *Agriculture and Human Values*, 3, (3), pp 15-20
- Pope, E, 1986, 'Importance of indigenous wild foods for women in the Kathama area, Machakos District, Kenya', paper presented in the KENGO seminar on the role of indigenous plants in our lives, 15 July
- Posey, 1984, 'Ethnoecology as applied anthropology in Amazonian development', *Human Organization* 43(2), pp 95-107
- Pretty, JN, ed, 1988, *Alpuri: Rapid Agroecosystem Zoning*, Malakand Fruit and Vegetable Development Project, Mingora, and International Institute for Environment and Development, London

Raintree, JB (ed), 1983, *Resources for Agroforestry Diagnosis and Design*, Working Paper No. 7, ICRAF, Nairobi

Raintree, JB and Young, A, 1983, 'Guidelines for agroforestry diagnosis and design', International Council for Research in Agroforestry, Nairobi

*Raman, KV, 1987, 'Scientists' training: experiences in promoting interaction with the farmers', IDS Workshop. See section 4.2 for a shortened version

Reed, C, 1977, *Origins of Agriculture*, Mouton Publishers, The Hague

*Repulda, RT, Quero, F, Ayaso, R, Guia, O de and Lightfoot, C, 1987, 'Doing research with resource poor farmers: FSDP-EV perspectives and programmes', IDS Workshop

Rhoades, RE, 1982, *The Art of the Informal Agricultural Survey*, International Potato Centre, Lima, Peru

Rhoades, RE, 1983, 'Tecnicista versus campesinista: praxis and theory of farmer involvement in agricultural research. A post-harvest example from the Andes'. Paper presented at a workshop on Farmers' Participation in the Development and Evaluation of Agricultural Technology, ICRISAT/SAFGRAD/IRAT, Ouagadougou, 20-24 September

Rhoades, RE, 1984, *Breaking New Ground: Agricultural Anthropology*, International Potato Centre, Lima, 71 pp

*Rhoades, RE, 1987, 'The role of farmers in the creation and continuing development of agri-technology and systems', IDS Workshop. See section 1.1 for a shortened version. Also available as 'Farmers and Experimentation', ODI Agricultural Administration (Research and Extension) Network Discussion Paper 21, December

Rhoades, RE and Booth, RH, 1982, 'Farmer-back-to-farmer: a model for generating acceptable agricultural technology', *Agricultural Administration*, Vol 11, pp 127-137

Rhoades, RE, Booth, RH, Shaw, R and Werge, R, 1985, 'The role of anthropologists in developing improved technologies', *Appropriate Technology*, Vol 11, No 4, pp 11-13

Rhoades, RE, Horton, DE and Booth, RH, 1986, 'Anthropologist, biological scientist and economist: the three musketeers, or three stooges of farming systems research?' in JR Jones and BJ Wallace (eds), *Social Sciences and Farming Systems Research*, Westview Press, Boulder, Colorado

Rhoades, RE and Bidegaray, P, 1987, 'The farmers of Yurimaguas', CIP (International Potato Centre), Lima, Peru

Rhoades, RE and Bebbington, A, 1988, 'Farmers who experiment: an untapped resource for agricultural research and development', paper presented at the International Congress on Plant Physiology, New Delhi, 15-20 February

Richards, P, 1985, *Indigenous Agricultural Revolution*, Hutchinson, London and Westview Press, Boulder, Colorado

*Richards, P, 1987, 'Agriculture as a performance', IDS Workshop. See section 1.6 above for a shortened version

Rocheleau, D, 1985, *Land Use Planning With Rural Farm Households and Communities: Participatory Agroforestry Research*, ICRAF Working Paper No 36, ICRAF, Nairobi

*Rocheleau, D, 1987a, 'The user perspective and the agroforestry research and action agenda', IDS Workshop. Published as Chapter 6 in H. Gholz (ed), *Agroforestry*, Martinus Nijhoff, Dordrecht, Netherlands, September 1987

Rocheleau, D, 1987b, 'Women, Trees and Tenure: Implications for Agroforestry'. Now published in Fortmann, L, and Bruce, J (eds), 1988, *Whose Trees? Proprietary Dimensions of Forestry*, Westview Press, Boulder

*Rocheleau, D, 1987c, 'Ethnoecological Methods to Complement Traditional Knowledge and Farmer Innovations in Agroforestry', IDS Workshop

Rocheleau, D, and van den Hoek, A, 1984, *The application of ecosystems and landscape analysis in agroforestry diagnosis and design: a case study from Kathema sublocation, Machakos district, Kenya*, Working Paper No 11, ICRAF, Nairobi

Rocheleau, D, Khasiala, P, Munyao, M, Mutiso, M, Opala, E, Wanjohi, B and Wanjuagna, A, 1985, 'Women's use of off-farm lands: implications for agroforestry research', project report to the Ford Foundation, ICRAF, Nairobi, mimeo

Rocheleau, D, and Raintree, JB, 1986, 'Agroforestry and the Future of Food Production in Developing Countries', *Impact of Science on Society*, 142:127-41

Rocheleau, D, Weber, F, and Field-Juma, A, 1987, Now published 1988 as *Agroforestry in Dryland Africa*, ICRAF, Nairobi

Ruano, A et al, 1982, 'Técnicas Básicas de Entrevista al Realizar Investigación sobre sistemas de cultivos', ICTA, Guatemala

Sagar, D, and Farrington, J, 1988, 'Participatory approaches to technology generation: from the development of methodology to wider-scale implementation', *Agricultural Administration (Research and Development) Network Paper No 2*, ODI, London, December

Sajise, P, 1981, 'Experimental education and its transfer: the Philippine experience', paper presented at the UNESCO-Rihed conference, Education in ASEAN Universities, Malaysia, 17-21 August

Sajise, P, 1984, 'Plant succession and agrosystem management', in Rambo, AT and Sajise, P (eds), *An Introduction to Human Ecology Research on Agricultural Systems in Southeast Asia*, UP Los Banos, Philippines, 327 pp

*Sanghi, NK, 1987, 'Participation of farmers as co-research workers: some case studies in dryland agriculture', IDS Workshop. See section 4.3 for a shortened version. Also available as an ODI Network Paper

Sanghi, NK, Vishnu Murthy, T, Kameshwara Rao, V, Prabhanjana Rao, SB, Vijayalakshmi, K, Venkateswarlu, J, Gobindswamy, S and Atwal, JS, 1983, 'Operation research in dryland agriculture for semi-arid red soils of Hyderabad', Project Bulletin No 3, All-India Coordinated Research Project for Dryland Agriculture, Hyderabad 500 659

Scheurmeier, U, 1988, 'Approach Development: a contribution to participatory development of techniques based on a practical experience in Tinau Watershed Project, Nepal', LBL, Landwirtschaftliche Beratungszentrale, CH-8315 Lindau, Switzerland

Schlippe, P de, 1947, 'Une methode cultural conservatrice-adaptation empirique indigene', *Semaine agricole de Yangambi*, INEAC

Schlippe, P de, 1953, 'Le revoulement rural en fonction de notre connaissance de la coutume agricole', INCIDI, The Hague

Schlippe, P de, 1956, *Shifting Cultivation in Africa: the Zande System of Agriculture*, Routledge and Kegan Paul, London

Schlippe, P de, 1957, 'Methodes de recherches quantitatives dans l'economie rurale coutumiere de l'Afrique centrale', Directeur de l'Agriculture de Forets et de l'Elevage, Bruxelles

Shaner, WW, Philipp, PF and Schmehl, WR, 1982, *Farming Systems Research and Development: Guidelines for Developing Countries*, Westview Press, Boulder, Colorado

Shrestha, RB, Sharma, AR and Galt, DL, 1987, 'Baseline Survey Report of Baglung District, and Naldung Key Informant Survey Report', *SERED Reports Nos 4 and 6*, Ministry of Agriculture, Socio-Economic Research and Extension Division, Khumaltar, Nepal

*Smutkupt, S, 1987, 'Farmers to farmers: researchers' role as facilitators', IDS Workshop

Spedding, CRW 1979, *An Introduction to Agricultural Systems*, Applied Science Publishers, London, 169 pp

Stone, RM, 1982, *Let the inside be sweet: the interpretation of music events among the Kpelle of Liberia*, Bloomington: Indiana University Press

Stoop, WA, 1988, *NARS Linkages in Technology Generation and Technology Transfer*, ISNAR Working Paper No 11, International Service for National Agricultural Research, The Hague, April

Sumberg, JE and Okali, C, 1984, 'Linking crops and animal production: pilot development programmes for smallholders in southwest Nigeria', *Rural Development in Nigeria*, 1, pp 25-9

*Sumberg, JE and Okali, C, 1987, 'Farmers, on-farm research and the development of new technology', IDS Workshop. See section 3.1 for a shortened version. See Sumberg and Okali 1988 for a fuller version

Sumberg, J and Okali, C, 1988, 'Farmers, on-farm research and the development of new technology', *Experimental Agriculture*, Vol 24, part 3, pp 333-342

Sutherland, A, 1986, 'Extension workers, small-scale farmers, and agricultural research: a case study in Kabwe Rural, Central Province, Zambia', *Agricultural Administration (Research and Extension) Network Paper No 15* ODI, London, March

Swift, J, 1979, 'Notes on traditional knowledge, modern knowledge, and rural development'. *IDS Bulletin* Vol 10 (2), pp 41-43

Swindale, LD, 1987, 'Farming systems and the International Agricultural Research Centres: an interpretative summary', in Proceedings of the Workshop on Farming Systems Research, ICRISAT, Patancheru, Andhra Pradesh, India

Thiele, G, Davis, P, and Farrington, J, 1988, 'Strength in diversity: innovation in agricultural technology development in eastern Bolivia', *Agricultural Administration (Research and Extension) Network Paper No 1*, ODI, London, December

*Thrupp, LA, 1987, 'Building legitimacy of indigenous knowledge: empowerment for third world people, or 'scientized packages' to be sold by development agencies', IDS Workshop

Torres, F, 'Networking for the generation of agroforestry technologies in Africa', ICRAF, Nairobi

Valmayor, RV and Manon, CR, 1987, 'Research information systems for agriculture and natural resources in the Philippines', in International Service for National Agricultural Research Management, *International Workshop on Agricultural Research Management*, The Hague, Netherlands, October 1987, pp 153-5

Vayda, AP, Colfer, CJP and Brotokusumo, M, 1980, 'Interactions between people and forests in East Kalimantan', in *Impact of Science on Society*, Vol 30 (3), pp 179-190

*Verma, GP, 1987, 'Farmers' participation in watershed management', IDS Workshop

von der Osten, A, Ewell, PT and Merrill-Sands, D, 1988, *Organization and Management of Research for Resource-Poor Farmers*, Staff Notes No. 88-13, ISNAR, The Netherlands, September

Vonk, RB, 1983, 'Report on Methodology and Technology Generating Exercise', Wageningen Agricultural University, Wageningen

Vonk, RB, 1986, 'Report on Siaya Agroforestry Project', CARE-Kenya, Nairobi

Wachira, KK, 1987, 'Women's use of off-farm and boundary lands: agroforestry potentials', ICRAF, Nairobi

Wade, MK, Fahmuddin Agus, D, and Colfer, CJP, 1985, 'The contribution of farmer-managed research in technology development'. International Farming Systems Workshop, Sukarami, West Sumatra

Wanjohi, B, 1987, 'Women's groups gathered plants and their agroforestry potentials in the Kathama area', Annex 1 in Wachira, KK (ed), *Women's Use of Off-farm and Boundary Lands: agroforestry potentials*, Final Report, ICRAF, Nairobi, pp 61-104

Waters-Bayer, A, 1989, 'Trails by scientists and farmers: opportunities for cooperation in ecofarming research', in Kotschi, J, (ed) *Ecofarming Practices for Tropical Smallholdings - Research and Development in Technical Cooperation*, GTZ, Eschborn pp 161-183

Waters-Bayer, A, and Bayer, W, 1988, 'Zero-station livestock systems research: pastoralist-scientist cooperation in technology development', paper for workshop on Operational Approaches for Participative Technology Development in Sustainable Agriculture, ILEIA, Leusden, 11-12 April

Watts, M, 1983, *Silent Violence: food, famine and peasantry in northern Nigeria*, Berkeley: University of California Press

WCED 1987 *Our Common Future*, Report of the World Commission on Environment and Development, Oxford University Press, Oxford and New York

Whyte, WF, 1981, *Participatory Approaches to Agricultural Research and Development:*

a state-of-the-art paper, Rural Development Committee, Center for International Studies, Cornell University, Ithaca, NY

Wilson, KB, 1987, 'Research on trees in the Mazvihwa and surrounding areas', unpublished report for ENDA-Zimbabwe, Harare

Wolf, EC, 1986, *Beyond the Green Revolution: New Approaches for Third World Agriculture*, Worldwatch Paper 73, Worldwatch Institute, 1776 Massachusetts Ave NW, Washington DC 20036

Worman, FD, and Heinrich, GM, 1988, 'Two operational approaches to participative technology development used by the Agricultural Technology Improvement Project, Francistown, Botswana'. Workshop on Operational Approaches for Participative Technology Development in Sustainable Agriculture, ILEIA, Leusden, 11-12 April

Wright, P, 1985, 'Water and soil conservation by farmers', in Ohm, HW and Nagy, JG, *Applied Technology for Farmers in Semi-arid Africa*, Purdue University, West Lafayette, International Programs in Agriculture, pp 56-60

Wright, P and Bonkoukou, EC, 1986, 'Soil and water conservation as a starting point for rural forestry: the Oxfam project in Ouahigouya, Burkina Faso', *Rural Africana*, 23-24, pp 79-85

Zandstra, HG, Price, EC, Litsinger, JA and Morris, RA, 1981, *A Methodology for On-farm Cropping Systems Research*, International Rice Research Institute, Los Banos, Philippines