IMPROVING THE EFFICIENCY OF ON-FARM RESEARCH AND ENSURING DIRECT FARMER PARTICIPATION IN TECHNOLOGY DEVELOPMENT, WITH FARMER TESTING GROUPS

G.M. Heinrich, F.D. Worman and J. Masikara[1]

This work was done by the Agricultural Technology Improvement Project (ATIP). ATIP is funded by the USAID and the Government of Botswana, and operated by the Mid-America International Agricultural Consortium (MIAC) jointly with the Department of Agricultural Research, Ministry of Agriculture, Botswana.

Introduction: Many agricultural research programs in developing nations now include an on-farm research component. Todays discussion pertains to this type of research. More particularly it pertains to on-farm research dealing with limited resource farmers. ATIP has been working with limited resource farmers in an on-farm research program in north eastern Botswana (Tutume Agricultural District) since 1983.

The Botswana Setting: Botswana, located in the central part of Southern Africa is a semi-arid area receiving 450-500mm of rain a year in the cropping areas (less in the western and southern regions). Poor soils and a highly variable rainfall distribution between years, within years, and even between lands areas in the same village, create a harsh environment for rainfed crop production.

Approximately 70 percent of the population live in rural areas and are engaged in small scale arable agriculture. There are more than 83,000 rural households cultivating approximately 300,000 hectares of land. Of the total rural households, 30,400 (36.5%) do not own cattle, while ten percent of the households own approximately 30 percent (2 million head) of the national herd. Most rural households operate a small mixed crop-livestock farming system. The mixed cropping system is based on sorghum with millet, cowpeas, groundnuts, and melons as secondary crops. The traditional cultivation pattern is to plant small areas by broadcasting seed and plowing with a moldboard plough. This is done after each planting rain for a three to four month period. Oxen, tractor and donkey traction are used, with only half of the households controlling their own traction. Yields tend to be low, approximately 250 kgs per hectare for sorghum, and Botswana farmers normally produce only about 30 percent of the country's basic grain requirements.

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[1]Assistant professors, temporary, Kansas State University. Dept. of Agronomy and Dept. of Agricultural Economics, and Senior Technical Officer, Dept. of Ag. Res., Min. of Ag., Govt. of Botswana, respectively. Currently assigned to the ATIP, Francistown, Botswana. The views expressed in this paper are solely the authors and do not necessarily represent those of USAID or GOB. Given at Annual ASA Meeting, Anaheim, California, USA, 27th Nov. - 2nd Dec., 1988. To be published in Agronomy Abstracts, 1988.

Farm families generally rely on livestock (both cattle and small stock) and off-farm activities, supplemented by government drought relief programmes, for their subsistence. Hence the limited resource farmer does not operate as a subsistence farmer, but as a substitution farmer, who will use any grain harvested to substitute for food which would have been purchased with funds from other source.

ATIP Agronomic Research: On-farm agronomic research in the Francistown area began with traditionally designed, researcher managed experiments, conducted on farmers fields. Within the first two years, three basic problems with this approach became apparent.

First, there were physical constraints on the number of experimental sites which could be implemented in this fashion. Five experiments, each implemented at three locations meant 15 locations to manage, and these absorbed most of the researchers time. However, production constraints within the region were myriad. Additionally a "package" approach was not practical because of the climatic variation both between and within seasons, and because of the heterogeneity among farmers in terms of draft, labor and capital resources. Thus there was a need to develop technology "options", which meant greatly expanding the range of research topics that could be addressed.

Second, it was observed that when the on-farm researchers had committed most of their time to the management of specific experiments, it became difficult for them to respond adequately to the needs of other client groups. For example, commodity research teams on research stations were developing useful technology options such as new planting equipment and crop genotypes which needed testing under farmer's field conditions. Extension personnel were requesting assistance in developing and implementing demonstration trials, and farmers were raising questions in the field regarding topics that researchers were not examining. Thus the highly structured on-farm research program did not have sufficient flexibility to respond to the developing needs of on-station researchers, extension and farmers.

Third, it became apparent that conducting experiments on farmer's fields did not mean that farmers were participating directly in the technology development process. The research agenda and experimental design were still controlled by researchers, with farmers doing the implementation and occasionally giving their opinions on the experiments in an ad hoc fashion.

To address these three important issues, the concept of farmer testing groups (FTG's) evolved. The objectives of the FTG's included:

(a) To broaden the scope of research topics to address a wide range of potentially useful technology options;

(b) To provide the flexibility in the on-farm research program necessary to respond to the developing needs of station-based commodity research teams, extension personnel and farmers; and

(c) To ensure direct farmer participation in the technology evolution process.

At present, in the ATIP work in the Francistown area, approximately 60 percent of research resources (and 70 percent of researcher time) are committed to a long term traditional type of research program. Approximately 40 percent of research resources and 30 percent of researcher time are devoted to the FTG activities.

The following is a brief description of how these FTG's operate, and their effectiveness in achieving the above objectives.

FTG Operation: The groups are composed of researchers, extensionists (from village, district and regional levels) and farmers. The groups are open to any village farmer who is interested in participating. At the first meeting of the group, researchers (both station-based and on-farm) discuss a wide range of technology options, addressing as many production constraints as possible. Farmers are also requested to raise questions on problems which they feel have not been adequately addressed. From the list of technology options which is thus developed, individual farmers select specific technology options they wish to test. Each farmer conducts their own trials, on their own farms, on the options they have selected. However, across farmers, trials of specific technology options are conducted according to a mutually agreed upon trial design. (e.g. a cowpea variety trial, if selected for testing by ten farmers, would be implemented using the same set of varieties, on the same size plots and with the same seeding rate, at all ten locations.) This allows subsequent statistical analysis. New equipment, small amounts of seed and required chemical inputs are provided by researchers. To aid statistical analysis, researchers also visit each trial once during the season to verify proper implementation. Throughout the season, farmers, researchers and extension agents meet as a group on a monthly basis. At these meetings, farmers discuss their progress with the trials, their observation and any problems encountered. Possible solutions to problems are discussed by the group.

Data Output: Researchers collect data on the dates of field operations, the crop and variety used (known because of the standard trial design and the use of researcher provided seed). The type of equipment used is also recorded. At the end of the season research staff weigh grain yields and conduct end-of-season farmer assessment interviews. These interviews are used to quantify farmer's opinions and perceptions of specific technology options (e.g. crop genotypes). Results are reported both to farmers and to other interested researchers.

Progress to Date: In 1985-86 the first group was formed in one village and included 12 participating farmers. During the 1987-88 season FTG's in three villages involved 134 voluntary participants who successfully implemented 152 trials (additional trials were attempted but were improperly implemented, destroyed by pests, or not implemented due to lack of traction, etc.) Nine different technology options were tested including three equipment prototypes (a hand row planter, a two-furrow plow and an inter-row cultivator), a cowpea variety trial, two tillage-/planting systems (double plowing, and row planting), one new cropping system, and two chemical input options (phosphate fertilizer and treated groundnut seeds). The number of technologies involved showed that a wide range of options could be tested using the group format. This range of options (and the number of replications) would have been difficult to encompass under a researcher managed testing program given ATIP staff limitations.

Information Output: The FTG format provided ATIP staff with information on technology performance under varied physical and climatic conditions across the region. Feedback on implementation problems was immediate, through the monthly meetings, and the formal end-of-season survey provided quantifiable information on farmer's perceptions and options on each technology tested. Village differences in resource constraints, and associated technology needs, were quickly identified through the process of farmers selection of technologies, their discussion of problems during monthly meetings, and through the formal end-of-season survey. All of this information helped to identify specific niches for the different technology options within the farming system. This type of information could be useful to extension agents who wish to more accurately target (i.e., make location specific) recommendations.

Summary: For a relatively minor input of researcher time, FTG's provided the on-farm research program with:

(a) the capacity to rapidly examine a wide range of technology options;

(b) direct farmer participation in the technology development process;

(c) the flexibility to respond to research needs identified by on-station researchers, extensionists, and farmers;

(d) a method for testing technology performance under farmer management, and assessing the acceptability of the technology;and

(e) a method for refining the targeting of technologies.

Thus the FTG's greatly enhanced the efficiency of the on-farm research program by expanding the program capabilities without radically increasing program costs. Simultaneously they ensured direct farmer participation in the research program.

Within the FTG's, the farmer participants decided which technology options they would work with. This ensured that the work done directly addressed their perceived needs and interests, and fit within their resource limitations. This is probably the major factor involved in the productivity and popularity of this approach.

MINISTRY OF AGRICULTURE
DEPARTMENT OF AGRICULTURAL RESEARCH
AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT
P.O. BOX 10275
FRANCISTOWN, BOTSWANA

ATIP PUBLICATIONS ON FARMER GROUPS

Norman, D., D. Baker, G. Heinrich, S. Masikara, and F. Worman. 1987. Farmer groups for technology development: experiences from Botswana. Prepared for Workshop on Farmers and Agricultural Research: Complementary Methods, IDS, University of Sussex, England, 27th-31st July, 1987. ATIP MP 87-4.

Worman, F., G. Heinrich, S. Masikara, B. Mabongo, and S. Bock. 1987. 1986 farmer's groups technology options testing trial. ATIP PR F87-6.

Worman, F., G. Heinrich and S. Masikara. 1988. Strengthening the link among farmers, extension and research for agricultural development in Botswana. Submitted for publication in the Informationcentre for Low External Input Agriculture Newsletter. ATIP MP 88-1.

Worman, F. and G. Heinrich. 1988. Two operational approaches to participative technology development used by the agricultural technology improvement project, Francistown, Botswana. Submitted for use in Conference on Participative Technology Development hosted by Informationcentre for Low External Input Agriculture, April 11-12, 1988, The Netherlands. ATIP MP 88-5.

Ntseane, P.G. 1988. ATIP groups report. ATIP WP 11.

Baker, D. 1988. Village groups in Shoshong and Makwate. ATIP WP 13.

Worman, F., Y. Merafe and D. Norman. 1988. Increasing farmer participation in FSR/E: the ATIP experience with farmer groups. Invited for Philippines Upland Research and Extension and Training Workshop, ViSCA, Baybay, Leyte, June 19-24th, 1988. ATIP MP 88-7.

Norman, D., D. Baker, G. Heinrich, and F. Worman. 1988. Technology development and farmer groups: experience from Botswana. Experimental Agriculture, 24 (3):321-331. ATIP EP 88-2.

Masikara, S., F. Worman and G. Heinrich. 1988. The role of farmer testing groups in research and extension: some experiences in Botswana. Paper given at the 8th Annual Farming Systems Symposium at the University of Arkansas, Fayetteville, Arkansas, USA, October 9th-11th, 1988. ATIP MP 88-11.