

Packaging Research Outputs into Extension and Training Materials: Experiences and Lessons Learned in Development of Grains in Ghana

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Resumé

Osei, C. K., Berchie, J. N., Gyasi-Boakye, S. & Ansah, I. O. O. *Le conditionnement des résultats de la recherche en matériau de la formation et la vulgarisation: Expériences et leçons apprises lors du développement des grains au Ghana.* La recherche engendre beaucoup de technologies qui restent sous-disseminées. Donc l'objectif principal de propager les résultats de la recherche aux utilisateurs n'est jamais achevé. Le papier décrit les expériences et les leçons apprises lors du conditionnement des résultats de la recherche en matériau de la formation et la vulgarisation pour l'utilisation des paysans et des vulgarisations sous le projet du développement des grains au Ghana. Basé sur les expériences et les leçons apprises, une série de recommandations sont proposées pour améliorer le processus de la production du matériau de la formation et la vulgarisation. Ce sont: i) déterminer le type du matériau à produire et pourquoi, ii) appliquer un plan efficace d'écriture et de rédaction, iii) employer les dessins appropriés, iv) évaluer les matériaux pendant et après la production.

Mot clés: Formation/matériaux de la vulgarisation, les résultats de la recherche, le processus de la planification et de la production.

Abstract

Research generates numerous technologies that remain under-disseminated. As a result one primary objective of research to develop improved production systems and get the research results out to the user is not achieved. This paper describes the experiences and lessons learned in packaging research outputs into extension and training materials for use by extension workers and farmers under the Ghana Grains Development Project. Based on the experiences and lessons learned, a series of recommendations are made for improving the production process of extension and training materials. These emphasize (i) determining the type of material to be produced and why, (ii) applying effective writing and editing guidelines, (iii) using appropriate designs and (iv) to evaluate materials during and after production.

Keywords: Training or extension materials, research outputs, planning and production process.

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Introduction

Several improved maize and legume production technologies were generated by researchers of the CSIR-Crops Research Institute (CRI) to boost maize and legumes production in Ghana under the Ghana Grains Development Project (GGDP). Among the new technologies developed were improved high yielding and disease tolerant maize and legume varieties of different maturity groups, specific soil fertilization regimes, effective weed control practices and timely harvest and appropriate storage practice. However, despite some examples of successful technology adoption, some technologies remained under-disseminated or only adopted by minority of potential users because of several factors (GGDP, 1991; Tripp *et al.*, 1992; Morris *et al.*, 1999). According to Gundel *et al.* (2001), one reason why technologies remain un-adopted is where research has been produced in a narrow academic context and has not been communicated widely. Butterworth *et al.* (2004) opined that technologies may remain under-disseminated due to in-appropriateness of form, content, and language of the communication material to the intermediate (extension clientele) or end user (farmer).

To help promote the adoption of improved technologies and well tested indigenous technical knowledge by CSIR-CRI, GGDP addressed the under-dissemination of technologies partly through packaging research outputs into

extension and training materials (GGDP, 1994). The GGDP which began in 1979 as a bilateral project to support maize and legumes research activities at the CSIR-CRI, had a main objective to assist the Government of Ghana in its effort to attain food self-sufficiency. Two important components of the project were the development of improved production systems through both on-station and on-farm research and getting research results out to the farmer through various communication channels (GGDP, 1994).

This paper describes the processes leading to the development and production of extension and training materials. It highlights the experiences and lessons learned of the Canadian International Development Agency (CIDA)-supported research project "Ghana Grains Development Project" in packaging research outputs into extension and training materials for use by extension workers and farmers.

Production of training and extension materials

A mid-term evaluation of GGDP in December 1995 highlighted the impressive body of information assembled and refined over the 15 year period in the form of extension and training materials (GGDP, 1996). In the period 1989-1994, GGDP produced several copies of a maize and legumes production guides, farmers' handbooks, flip charts and factsheets of several topics on maize and legume production

to provide information and guidance on the acquisition of skills for research, production or extension (Table 1). Alongside the extension and training materials were the publication of research and technical reports, conference/workshop papers, journal publications and several internal documents. Table 2 shows the effectiveness of the different dissemination pathways among users.

Methodology or strategy

The strategy followed by the GGDP in the planning and development of extension materials involved the following processes:

The planning process

The processes leading to the development and production of GGDP extension and training materials varied from one material to the other. However, the planning process was generalised under development, production and distribution of the material (Figure 1).

The first step towards developing a material was the characterisation of the target audience for the material. Once the readers or users were known, the materials were targeted to their reading knowledge and skill levels. This is in accordance with the view expressed by Zeitlyn (cited by Velasco *et al.*, 1996) that written documents have to be appropriate for the people to whom they are addressed, in terms of culture, educational level, content and their application or technical use. Hubley

(1993) has noted that different characteristics of the target group can change the aims and effectiveness of a piece of communication.

The second step was to determine the type of material needed. The GGDP produced different types of extension materials. The decision regarding the type of material to produce was directly related to the purpose and objectives of the material and the literacy level of the user. According to FAO (1992), materials may take different forms such as a brochure, a booklet, handout or production guide.

The third step towards developing a material was to select the content. The approach used was to match the content with the designed aims and objectives of the extension or training material. Most of the materials developed were used in specific training situations to facilitate the acquisition of knowledge and skills. The content for each type of training material therefore depended upon the course objectives. Citing an example of how to link content of a material to a training course on rice production, WARDA (1995), indicated that a training material for a course module on rice production systems designed to provide knowledge should contain up-to-date theoretical information that describes rice production systems. According to Ellington and Race (1993), one way of planning detailed content before embarking on the writing task is to ask what the reader must know

Table 1. Types of extension or training materials and targeted user-groups.

<i>Type of material</i>	<i>Targeted user-group</i>	<i>Comments</i>
? Production Guide	? Field technicians and Subject Matter Specialists (SMSs) who are involved in giving production advice or engaged in production training with farmers. ? It is also popular among agricultural students and literate farmers.	? It is designed specifically for production or production oriented training. More than 1000 copies of the guide have been produced.
? Farmer Handbook	? The farmer. ? The Agricultural Extension Agent (AEA). ? The agricultural student.	? The handbook contains a lot of illustrations to show farmers how to do a particular activity ? It aims to improve farmers' crop production practices. ? Eight different titles on maize and legume production were produced.
? Extension Flipchart	? Field technicians and Subject Matter Specialists (SMSs) who are involved in giving production advice or engaged in production farmers training with.	? They are visual aids with pages that contain bold illustrations arranged sequentially to cowpea communicate information on maize, and soybean production. ? Eight different titles on maize and legume production were produced.
? Factsheets	? Field technicians and Subject Matter Specialists (SMSs) who give advice or are engaged in production training with farmers. ? Also useful to literate farmers and agricultural students.	? They are designed as simple, single sheet publications limited to convey one clear message. ? More than thirty different titles on CSIR-CRI mandate crops have been produced.
? Research Guide	? Research assistants and field technicians involved in agricultural research .	? Research Guides dealt with specific research topics. ? Sixty research topics were

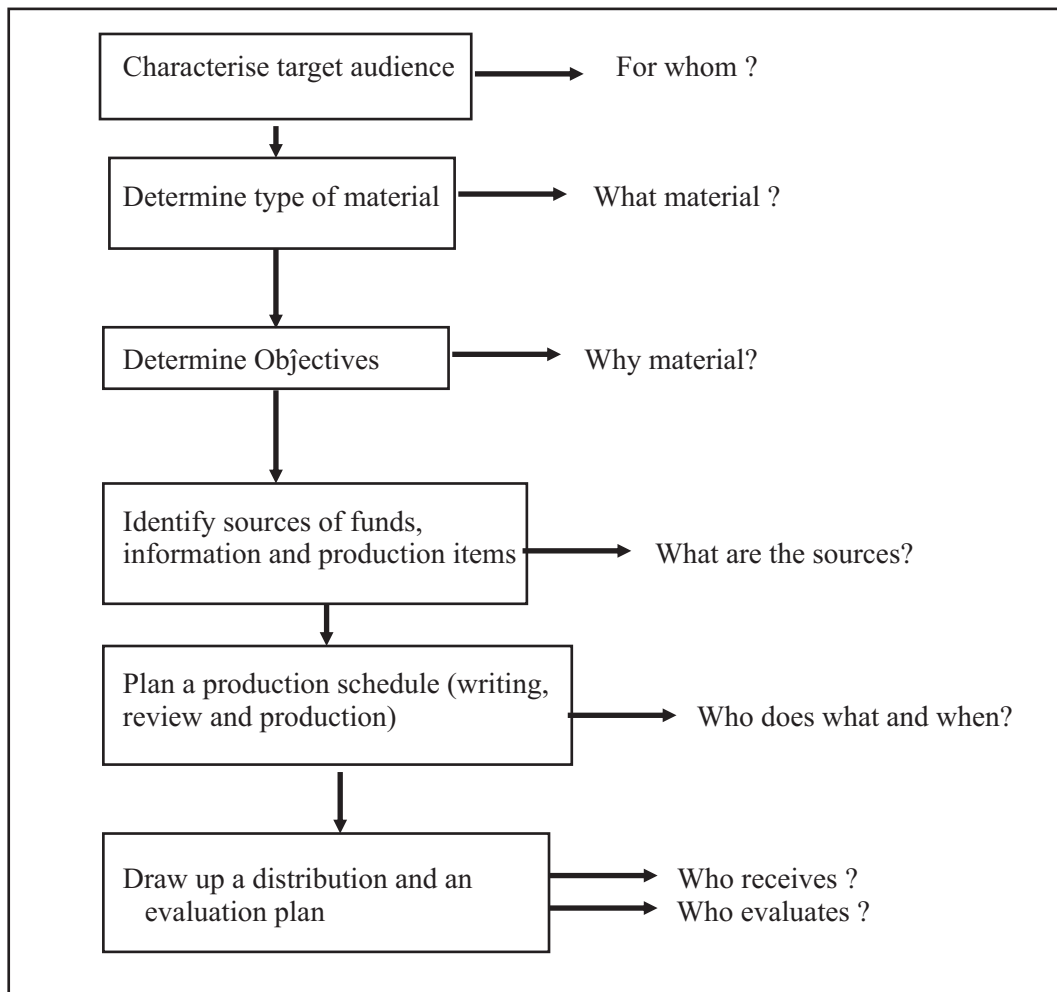


Figure 1. Planning process for developing extension materials to meet the demand for information.

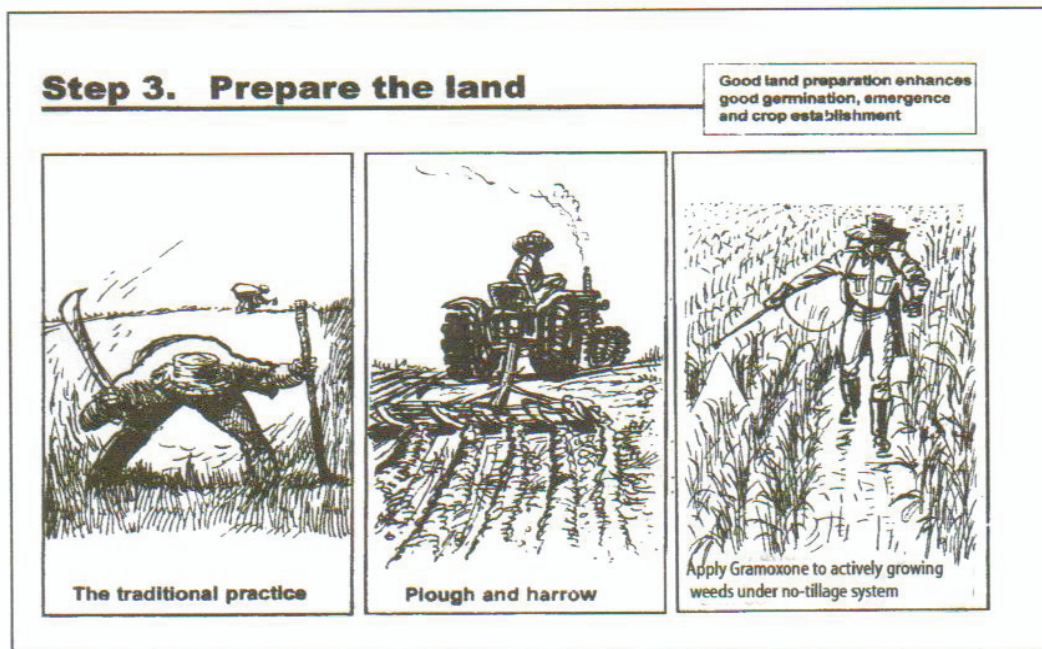


Figure 2. Examples of illustrations used in a GGDP farmer handbook

after using the material.

The kind of information included in the materials was drawn mainly from research results of project activities. The question of how detailed and which details should have priority depended on the type of material to be developed. Turk and Kirkman (cited by Velasco *et al.*, 1996) indicated that "failure to select information appropriately is a common weakness in scientific and technical writing".

A fourth step in the process was the review of written manuscripts by subject matter specialists. Scientists who have work experience in a particular subject area were tasked to review manuscripts to check for accuracy of content. The material development specialist ensured that all materials developed went through a process of technical and language editing. This approach is similar to the view expressed by WARDA (1995) that every good material must be edited to ensure among others that all facts are

Table 2. Effectiveness of the different dissemination pathways among users.

<i>Dissemination pathway</i>	<i>Effective with researchers</i>	<i>Effective with intermediate users (e.g. extension, NGOs)</i>	<i>Effective with end users (e.g. farmers)</i>
Field demonstrations Field days	x	xx	xxx
Training Programmes (CMRT)	x	xxx	xxx
Extension materials (fact sheets)	x	xxx	xxx
Mass communication (Radio)	x	xx	xxx
Informal and Personal communication	xx	xx	xxx
Conferences or Workshops	xxx	xx	x
Annual Reports	xxx	xx	x
Scientific Journals	xxx	xx	x
Seminars or Meetings	xxx	xx	x

Source: Brainstorming session in a GGDP training programme, 1992.

xxx = very effective

xx = effective

x = somehow effective

correct, no grammatical errors or spelling mistakes made, punctuation marks are used properly and copyright laws respected.

A fifth step was to ensure that materials were readable by writing in simple, straightforward and concise language. Attention was paid to attractive lay out with regard to white space, different typefaces, illustrations and other elements where necessary. Numbers, bullets, dashes and other symbols were used to emphasize lists of related ideas. According to Turk and Kirkman (cited by Velasco *et al.*, 1996), long and unfamiliar words affect readability while Ellington and Race (1993), indicated that layout can be just as important as the content in determining whether it does its job effectively. The use of different typefaces for main text and headings or captions is in accordance with the view expressed by Boag (1992) that serif typefaces (thin projections at end of letters) are best for large amounts of continuous text while sans serif (no projections at end of letters) is best reserved for headings, captions and short pieces of text.

The sixth step was to pilot-test materials with users to identify their appropriateness and especially their suitability in terms of understanding and appreciating content, symbols and illustrations before the materials were used. Pilot-testing a material during production is done to identify deficiencies which can be rectified

before the materials are used in actual training situations (WARDA, 1995). As Raab *et al.* (1987) highlighted: "Early evaluation can indicate that something has gone wrong".

The production process of materials ended with camera-ready prints which were sent to the printer with clear specifications for the job. The factors to consider in choosing a printer for a job include cost, services, reputation and quality of work WARDA (1995).

Discussion of experiences and lessons learned

Research outputs in the form of technical reports

Most of the original GGDP research outputs were published in the form of research reports. The style of the written reports did not provide accessible formats to the different audience groups (extension, farmers and students). This confirms the observation made by Butterworth *et al.* (2004) that many research reports provide detailed summary of research mostly to satisfy those with high level of understanding of the subject. These reports therefore required 'translation' before they were usable as disseminating materials.

Farmer literacy levels

All dissemination materials were produced in English. While this presented no problems to extension workers, majority of farmers relied on literate family members to interpret written information. The lack of

translated versions of farmer materials into local languages affected their use by illiterate farmers. This view is supportive of the recommendations by Kwateng (1991) and Seabrook (unpublished) that there is need for farmer materials to be written in local (vernacular) languages. Extension messages must therefore be written specifically for particular audience using language appropriate to their level of understanding, selecting messages which interest them and using a medium they will receive and pay attention to (van den Ban and Hawkins, 1994).

Use of illustrations in materials

One of the popular series of materials produced was the farmer handbooks on maize, cowpea and soybean. The inclusion of several illustrations (Figure 2) in the materials made them popular among maize and legume farmers. In the evaluation of the usefulness and appropriateness of the materials, farmers judged the illustrated activities to be clear and useful. They contended that the illustrations made the material attractive and accessible despite their limited literacy skills (Kwateng, 1994). This is in accordance with the view expressed by Davis *et al.* (1992) that the illustrations used in materials must be clear and large enough to be immediately comprehensible and make a point relative to the scientific message. Van den Ban and Hawkins (1994) noted that information that cannot be arranged by words alone may be transmitted visually, for example, how to recognize

a specific plant. They noted that information that is given in words and pictures is remembered more easily and reader's interest is increased.

User-specific dissemination materials

The wide range of materials produced by the GGDP indicates the concern for the information needs and characteristics of target audiences. Distinction was made between different target audiences before the production of a material. This approach is similar to the view expressed by Stapleton *et al.* (1995) that readers of agricultural and related research fall into different groups including researchers, university lecturers, extension agents, farmers, policy makers and students. Extension messages must therefore be targeted at particular audience selecting messages which are useful to them.

Research team approach

The setting up of research teams including communication specialists to determine the content of materials and their production schedule was found useful in the production of materials. It ensured that information provided was technically correct. This approach is supported by the findings of Velasco (1996) that a team approach for the production of documents will ensure valuable inputs from different professional perspectives and therefore enrich the outcomes.

Distribution network of materials

The extension agents expressed

concerns about the poor distribution network of the materials. Though several large copies were printed and distributed to field extension workers, some extension agents did not have the materials. Visits to the District centers showed substantial numbers of materials in the offices of the District bosses. The lack of an appropriate distribution list partly contributed to poor distribution of materials produced. As WARDA (1987) highlighted, "The development of a distribution list provides a guide to the distribution of materials to users".

Evaluation of materials

Extension materials were evaluated during production and after use (2-3 years after production). Evaluation during production provided information to correct deficiencies before the materials were used. Rees *et al.* (2004) have also indicated in a recent study that pre-testing information materials before use was invaluable in ensuring clarity and effectiveness of the message being developed. Equally important was evaluation conducted after use of material. It provided information to improve subsequent versions of the materials. Some of the materials have been reproduced by NGOs while one has been translated into local languages by an agricultural project. This approach is similar to the view expressed by WARDA (1993) that the best proof of the usefulness of a publication is the extent to which it is applied, adapted and reproduced by national programmes.

According to Velasco (1996), the inclusion of an evaluation form at the end of all published documents will maintain a two-way process between the producers and target groups.

Recommendation and Conclusions

Experiences gained from packaging research outputs into extension and training materials can be formulated as recommendations for stakeholders in material development to enrich future outcomes. The following are recommended:

? Use the research team approach to package research outputs to ensure inputs from different professional perspectives. This will enrich outcomes.

? The planning process of extension material development should emphasize the type of material to be produced, for whom the material are to be produced and why the materials have to be produced.

? The process should also identify sources of information, apply guidelines for effective writing and editing.

? The production processes should ensure use of good illustrations (drawings, photographs, figures and tables) and design (layout, typeface and typesize and white space).

? Look out for programmes or projects that are interested in reproducing and or translating materials into local languages to speed up the use of suggested technologies.

? Include evaluation forms at the

end of all published documents for the reader to complete and return. This provides a feedback for the improvement of subsequent versions.

? Draw up a distribution list to aid in the distribution of materials developed. A distribution list will facilitate the documentation of where materials are being sent to and numbers distributed. It can also aid in follow-up evaluation.

? Employ newer tools such as computers, internet, CD-ROM and DVD-ROM to distribute extension or training materials to intermediate users.

These recommendations have various implications for research budgets, and project or programme designs, and research team skills all of which need attention.

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References

- Boag, A. 1992. Designing business documents. U.K. Monotype Typography Ltd.
- Butterworth, R. R. B., Adolf & Pound, B. 2004. Experiences of Packaging research outputs into extension material. *Uganda Journal of Agricultural Sciences* 9(1): 111-118.
- Ellington, H. & Race, P. 1993. *Producing Teaching Materials. Second edition*, London, Kogan Page.
- Davis, M., Davis, K. J. & Wolf, D. C. 1992. Effective communication with poster displays. *Journal of Natural Resources and Life Sciences Education* 21(2):156-160.
- FAO. 1992. Planning for effective training: a guide to curriculum development, Rome, Italy.
- GGDP. 1994. The Ghana Grains Development Project Report.
- GGDP/CRI. 1994/1995. The Ghana Grains Development Project/Crops Research Institute Annual Report.
- Ghana Grains Development Project. 1991. A Study of Maize Technology Adoption in Ghana. Mexico, D. F.:GGDP.
- Gundel, S., Hancock, J., Anderson, S. 2001. *Scaling up strategies for Research in Natural Resource Management, A comparative review*. Natural Resource Institute, University of Greenwich, Chatham.
- Hubbly, J. 1993. Communicating for managerial effectiveness. California, Sage.

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- Kwateng, J. A. 1991. *Evaluation Report on the usefulness and Appropriateness of the CIDA/GGDP Maize & Cowpea Flipcharts and Farmers Maize Handbook*. Submitted to the joint-Coordinators, Ghana Grains Development Project, Kumasi, Ghana.
- Morris, M. L., Tripp, R. & Dankyi, A. A. 1999. Adoption and Impact of Improved Maize Technology. A case study of the Ghana Grains Development Project. Economics Programme Paper 99-01, Mexico DF; CIMMYT.
- Raab, R. T., Swason, B. E., Wentling, T. L. & Clark, C. D. 1987. A trainers guide to evaluation: A guide to training activity improvement. Rome, FAO.
- Rees, D. J., Imairit-Oumo, F., Nangoti, N., Okwadi, J. & Okurut-Akol, H. 2004. Design and implementation of a communication strategy for agricultural research in Uganda: Experiences and lessons learnt. *Uganda Journal of Agricultural Sciences* 9(1):132-136.
- Seabroek, M. F. (unpublished). The role of vernacular language in farming.
- Stapleton, P., Youdeowei, A., Mukanyange, J. & Helen van Houten. 1995. Scientific writing for agricultural research scientists, a training reference annual. Hong Kong: WARDA/CTA.
- Tripp, R., Marfo, K., Dankyi, A. A. & Read, M. 1987. Changing Maize Production Practices of Small-scale Farmers in the Brong-Ahafo Region, Ghana. Kumasi: Ghana Grains Development Project.
- Van den Ban & Hawkins, H. S. 1994. *Agricultural Extension*. Longman. Malaysia.
- Velasco, R., Kowalski, R. & Lowe, J. C. 1996. Technology Transfer Materials - Are we Learning the Technology Transfer? *European Journal Agricultural Education and Extension* 3(1):35-46.
- WARDA. 1993. Human resources for rice science in West Africa. Sayce Publishing, Exeter, United Kingdom.
- WARDA. 1995. Development of Training Materials in Agriculture. Sayce Publishing, Exeter, United Kingdom.