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~~ANALYSIS OF BEAN SEED CHANNELS~~
~~IN THE GREAT LAKES REGION:~~
South Kivu, Saire, Southern Rwanda,
and select bean-growing zones of Burundi.

Summary by Louise Sperling

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PREFACE

This volume, the thirteenth in a working document series that serves research on common bean (*Phaseolus vulgaris*) in Africa, is a summary of research carried out by several groups working in three countries. This work was initiated partly in response to the concern of participants in the network for bean improvement in the Great Lakes region (RESAPAC) to benefit farmers, and the priority given by them to understanding how farmers obtain bean seed.

The Network on Bean Research in Africa serves to stimulate, focus and coordinate research efforts on common bean. The network is organized by the Centro Internacional de Agricultura Tropical (CIAT) through three interdependent sub-regional networks, for the Great Lakes region of Central Africa, for Eastern Africa and, in conjunction with SADC, for the Southern Africa region.

Working documents will include bibliographies, research reports and bean network discussion papers. These publications are intended to complement two associated series of Workshop Proceedings and Reprints.

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Further information on regional research activities on beans in Africa is available from:

Pan-Africa Coordinator, CIAT, P.O.Box 23294, Dar es Salaam, Tanzania.

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**ANALYSIS OF BEAN SEED CHANNELS IN THE GREAT LAKES REGION:
South Kivu (Zaire), Southern Rwanda and select bean-growing zones of Burundi**

Summary Report by Louise Sperling

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INTRODUCTION

A prime concern with improved varieties is their accessibility: new cultivars can increase food production only if they reach and can be maintained by growers. Official seed services or development projects are often important in launching varieties but may be relatively ineffective in reaching the mass of farmers, particularly the smallest and the most isolated (CIAT 1990). Further, for the poorer farmers, use of new cultivars may involve a repeated cycle of loss and restocking: adoption for them may thus require continuing support—rather than a one-time cultivar delivery service (Sperling and Loevinsohn 1993).

It was with the aim of improving delivery systems for new cultivars that research was carried out to examine the informal channels for bean seed acquisition in all three Great Lakes countries. Studies aimed to assess seed needs by region, by social class and by season; to improve understanding of what farmers desire in seed quality; and to evaluate the relative strengths of current seed channels for beans.

METHODS

Seed investigations were carried out by means of questionnaire, employing both open and closed formats, depending on the complexity of the subject being pursued. Seed samples of released cultivars were used to identify improved varieties, and local measures (baskets and pots) helped clarify the quantities of seeds sown. In the South Kivu Region, 227 farmers were interviewed in two major regions: "Kabare", the community surrounding the research station, and "Walungu", the site chosen for the national program's most intensive on-farm testing. In Southern Rwanda, 152 farmers were interviewed in Butare and Gikongoro Prefectures, in the 14 communes located in proximity to ISAR headquarters. In Burundi, 295 farmers were interviewed in three major bean growing regions (N = c.100 for each): Kirundo

was chosen due to high quantities of beans sown, yet limited development project intervention; Gitenga was chosen to represent an area where bean cultivation is facing difficulties yet where project support has been significant; and Makamba was selected due to the local tradition of growing climbing varieties. Samples were chosen randomly, with all wealth classes represented, and interviews were held by preference with adult women, those most experienced and knowledgeable of bean seed. Aggregate national data are presented in this overview; individual country reports highlight regional divisions where appropriate (i.e. in Burundi). Wealth divisions ("poor", "medium" and "rich") were defined qualitatively according to house type and size, land and livestock holdings, tenure rights (in Zaire) and other notable factors such as off-farm sources of income (particularly in Rwanda and Burundi) and fertilizer use and labor hire (in the case of Burundi).

FINDINGS

Quantity of seed planted. The quantity of bean seed planted seasonally, by year, and by social class is summarized in Table 1. In Rwanda, the season "A", September to January, proves most important both in the quantities sown (on average 100-150% greater than season B- March to June) and the number of farmers planting. In Zaire, these two seasons are more evenly matched along both parameters. We see, however, a surprisingly large and relatively new "off-season" production: 1) farmers use the lowland marsh during the long dry season (season "C") and 2) many are taking the risks to plant the so-called "counter-season" of January to April (season "D"). In Burundi, the A and B seasons are relatively equal, with the B being slightly more important (NB. This conflicts with the "common wisdom" that farmers are abandoning beans in season A). As in Zaire, an increasingly large number of Burundian farmers (here, 45%) are intensifying production by planting the "C" season in the valley bottoms. Overall, the poor in Rwanda and Burundi sow only a quarter of what the wealthy sow on a yearly basis, with the figure rising to 2/5 in Zaire.

The number of seasons farmers plant significantly varies by wealth only in Zaire ($p < .001$, $F = 7.6$), with the richer planting an average of 2.33 and the poor 1.95. Further, of those who plant a single season, 85% fall have been characterized as "poor". No such wealth-by-seasons differentiation emerged from either the Rwandan or Burundian data.

Evolution of seed sources. Most farmers in South Kivu, Southern Rwanda, and Burundi (73%, 84%, and 87% respectively) obtained their original seed (at the time of household establishment) from relatives, usually the man's parents. The couple often resides near these relatives and such seed is preferred as it is said to be well-adapted locally. With time, however, many had also made partial modifications in the composition of their seed stocks (40% for the Zairian sample, 60% for the Rwandan and 22% for the Burundian) with a good number changing their seed stock completely (14%, 18%, and 61% respectively). When in need of seed, very few felt able to go back to their parents for aid or rejuvenation of mixture types (less than 2% for all samples). It is important to note how wealth differences relate to original seed acquisition; the rich generally get stocks from their parents (100% in Rwanda, 95% in Zaire, 94% in Burundi), while comparable figures for the poorer are 36% in Rwanda, 44% in Zaire and a surprising 90% in Burundi. In Rwanda, where neighbors provide a second valued source of seed, we find a particularly disadvantaged group of farmers who received original stocks neither from parents or neighbors; 72% fall into the poorer category.

Current use of seed sources. Table 2 lists the varied sources identified by farmers for bean seed acquisition, and illustrates their frequency of use during the principal bean season; data from Rwanda and Zaire are drawn from season A (either 1990 or 1991, depending on when the farmer last sowed) and for Burundi from the major season B (in this case, 1992). In all countries, about three-fifths of the farmers obtain at least some of their seed from their own production ("own stock"), with a market channel being the other, very significant, source. When farmers speak of market sources in South Kivu, they are generally referring to the many decentralized markets at which farmers themselves may sell their own bean seed; hence the categories "market - general category" and "market-farmer merchant" are not well differentiated for the Zairian data. In Rwanda and Burundi, in contrast, farmers clearly distinguish among the large town markets ("market- general category"), the town wholesalers who own their own shops ("large merchants"), the decentralized country or boutique vendors ("local merchants"), and the farmers who sell their own harvest in town or rural marketplaces ("market-farmer merchant"). This last type is relatively rare in Rwanda, as farmers who sell (or exchange) their own production usually do so in the countryside as "one neighbor to another" (hence the category "neighbor"). Note that this category of "neighbor" for seed is little found in the South Kivu region.

Use of the two major categories of seed channels-- "own stock" and "market" (the latter being a composite category of all market types)-- varies considerably by wealth. In all three regions, only about half of the poorer farmers can draw on their own stock (for any quantity of seed), in contrast to the wealthy who use 100% of their own harvested seed for at least one season of the year (Table 3). However, once farmers use a source (e.g. whether "own stock" or "market") the proportion of seeds coming from that source varies relatively slightly by wealth: for example, poor or rich farmers who draw from their own stocks may do so for the great majority of their seed needs (Table 4). Similarly, some farmers from all classes may exclusively rely on the market for seed needs. In our sample, a very small group of the rich (2 cases in Rwanda and Zaire and 1 case in Burundi) sought to overhaul completely their seed stock for a single season in search of better performing mixtures. Table 5 gives an idea of just how important the market may be in terms of quantities of seed purchased: on average each Burundian farmer purchases from the market 5.4 kgs the A season and 15 kgs for the B season.

Note that the rich seem to use markets to find select genetic material-- rather than to top off or fill in for inadequate seed stocks. The reliance of the poor on the market is quantitatively and qualitatively different. In the Rwandan sample, 33% of the poor purchase 100% of their seed at least one season, 13% do so for two consecutive seasons, and 18% purchase 100% of their seed from the market every time they plant-- whether it be one or two seasons yearly. (This tally excludes those who depend on the church or the state for free seed.) Farmers lament they may even consume their entire crop green, either the pods or the fresh seeds. The reliance on market seed is even higher in Burundi: 70% of the poor obtain 100% of their seed from the market for at least one season, 39% for at least two, and 36% every time they sow. Finally, the reliance of the South Kivu poor on market seed is the most pronounced: 52% buy 100% of their seed for one season, 32% for two or three seasons, and 40% of the farmers buy 100% of their seed every time they plant--whether it be one, two or three seasons annually. Here farmers are clearly seeking something to put in the ground that will sprout; the concern is for seed quantity, not for refining choice of varieties.

Farmer assessment of "good seed" and seed channels. Farmers in both the Rwandan and Burundian studies were asked to define what they considered "good seed". Rwandans (N=89) focused on varietal aspects in 76% of the responses (emphasizing adaptedness to local conditions and earliness as desired traits) with physical or phytopathological traits representing the rest of the criteria cited (good physical appearance, good germination, and seed treated with pesticides). Burundian responses for the entire sample (N=295) were similar and are detailed in Table 6: varietal aspects were particularly cited (65% of the responses) with a preference for small grained-seed ("does well on our poorer soils" and is "economic to sow"). Formal seed service concerns such as good conditioning or "healthy" seed were given little prominence as farmers feel they can readily control these aspects themselves. Given the varietal emphasis, farmers generally prefer to use mixtures long-tested on their own farms as, through a process of selection, such seed is regarded as well-adapted to the farmers' specific agronomic conditions. In Rwanda and Burundi, in terms of both genetic and physical quality, "second best" seed is said to come from neighbors whose planting conditions might be similar and who have an ethic to deliver well-sorted beans (e.g. not broken, immature, discolored, or damaged in storage) (see also CIAT 1988). In Zaire, such neighbors' seed may be found at the market, where buyers search for faces and/or varieties with which they are very familiar.

The problem with such better-quality seed is both its relatively high cost as well as availability. Not surprisingly, the wealthier may have greater access than the poor to "better quality seed": For example, in Rwanda, 50% of the sources they used in season A outside their own stocks fell into the categories of "neighbors" (better quality, local seed) or "development projects" and "government offices" (better quality, exotic seed) while such locales represented 18% of the sources used by poorer farmers' for acquisition of seed off-farm. Ultimately farmers may be obliged to buy from commercial channels--just because seed is available upon request. Table 7 illustrates this point in reference to Rwandan assessments of their potential seed acquisition sources. While some 17 criteria were used in the evaluation, only a handful emerged as determinant. The major advantage of market seed seems to be that one can obtain it: its quality is not particularly appreciated. Note the degree to which farmers fear being "cheated" in any commercial transaction. In Zaire, the only major non-farm source evaluated, the market, was positively regarded in terms of seed availability and the wide choice of varieties on offer and negatively in terms of cost and poor physical quality. Genetic quality of seed did not figure probably because much of the seed for sale is of relatively local origin.

Farmers' use of improved seed. As seen above, the use of improved seed -, that is, phytopathologically-superior seed ("clean") coming directly from development projects, seed services or national institutes- was quite small in all three countries. The use of genetically-improved varieties, however, was more difficult to establish as farmers may not know the origin of their cultivars and varieties may be integrated into mixtures. Identification of improved climbing varieties is easier than of improved bush as the former type may be totally novel to an area or local genetic diversity among climbers may be low. The evidence from Burundi was promising, and particularly surprising given that the national program has made limited efforts to promote climbers: 23% of those who grow climbing varieties (concentrated in Makamba) have adopted improved cultivars. More targeted studies are underway within the Great Lakes Region to look at use of genetically-improved varieties (see Musungayi et al. 1992, MINAGRI/CIAT 1992, Scheidegger and Nyabyenda, 1992).

DISCUSSION AND IMPLICATIONS

These results clearly show that relatively large numbers of farmers regularly procure a high proportion of seed from outside their own farms. While neighbors' (hence locally-adapted) seed is preferred (whether purchased on-farm or at market stalls), many farmers are obliged to purchase what they consider "second quality" seed through commercial channels which offer regular supplies of a range of cultivars. Poorer farmers, in particular, are constant market clients, unable to save seed harvested or, at times, forced to eat entire harvests as green beans or green seed. Up to now, development projects and national seed programs have provided proportionally little of the bean seed in use, although some genetically-improved varieties are reaching farmers through the informal channels. For farmers, the present seed procurement channels often represent a trade-off between quality seed (genetically and physically) and cost and availability. Future strategies for the distribution of improved seed should place emphasis 1) on making available genetically-superior varieties (vs. a focus on phytopathological or physical quality) and 2) on distributing them through decentralized, ongoing, and existing seed procurement channels. The key will be to keep down cost while maximizing farmers' access.

REFERENCES

- CIAT. 1988. Annual Report. Bean Program. The Great Lakes, 303-341. Working Document No. 53, 1988.
- CIAT. 1990. Annual Report. Bean Improvement. Social Science in Africa, pp. 524-545.
- MINAGRI/ISAR/CIAT (Ministère de l'Agriculture, de l'Élevage et des Forêts). 1992. The adoption of improved climbing bean varieties in Rwanda. Study completed jointly by le Département des Statistiques Agricole du MINAGRI, L'ISAR et le CIAT, Saison 1992B. Paper presented at Great Lakes Regional Bean Seminar, Goma, Zaire, 2-6 November 1992.
- Musungayi, T., Muhandikire, R. et Sperling, L. 1992. Adoption de haricot volubile a Kabare et Walungu (Zaire). Paper presented at Great Lakes Regional Bean Seminar, Goma, Zaire, 2-6 November 1992.
- Scheidegger, U. and P. Nyabyenda. 1992. Adoption studies of improved bush bean cultivars in Rwanda. Paper presented at Great Lakes Regional Bean Seminar, Goma, Zaire, 2-6 November 1992.
- Sperling, L. and Loevinsohn, M. 1993. The dynamics of adoption: distribution and mortality of bean varieties among small farmers in Rwanda. Agricultural Systems 41:441-453.

Table 1: Farmers planting beans and seed sown in South Kivu, Zaïre, Southern Rwanda, and the provinces of Kirundo, Gitega and Makamba of Burundi 1990-1992

Season	Zaire		Rwanda		Burundi	
	Kgs sown	% farmers sowing (N = 227)	Kgs sown	% farmers sowing (N = 152)	Kgs sown	% farmers sowing (N = 295)
A	14.6	85	21.0	95	39.7	84
B	13.6	89	9.9	83	45.4	100
C	7.4	19			14.7	45
D	11.2	15				
Kg/an						
P ¹	20.6		14.6		36.9	
M	34.2		23.9		81.3	
R	48.9		56.6		161.9	

¹ P = Poor, M = Medium, R = Rich

Table 2: Percent of farmers growing beans who used a particular source during the principal bean growing season 1991-2

Source	Zaire (N = 194)	Rwanda (N = 144)	Burundi (N = 248)
Own stock	59	63	66
Relatives			1
Market: General category	58	9	24
Market: farmer seller	1	11	12
Market: Small local merchants		3	11
Market: Large merchants		9	3
Neighbors	1	10	4
Development Project			3
Church		3	<1
Cooperative		1	<1
ISAR/INERA/ISABU			
State		1	

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* No farmer used two of these sources, that is, there is no duplication. One-third of Rwandan farmers used the market.

Table 3: Percent of farmers using the two major seed channels, by social class and season, 1990-1992

	Zaire		Rwanda		Burundi	
	A	B	A	B	A	B
Own stock						
Poor	51	49	44	62	55	34
Medium	65	64	63	85	81	73
Rich	80	100	91	100	100	85
Market						
Poor	66	60	46	26	51	80
Medium	40	53	36	5	22	52
Rich	13	17	6	0	4	32

Table 4: Percent of seed obtained from a source by those who use it: review of the two major seed channels season A and B, 1990-1992

	Zaire		Rwanda		Burundi	
	A	B	A	B	A	B
Own stock						
Poor	82	85	92	93	85	71
Medium	84	90	87	96	98	80
Rich	98	88	99	98	98	84
Market						
Poor	84	88	92	93	93	92
Medium	80	78	83	100*	81	70
Rich	100*	54	100*	0	62*	64

* These figures should be interpreted cautiously: in all four cases, the data refer to a very small sample, 2-4 farmers.

Table 5: Seed (quantity and %) Burundian farmers procure from the two principal seed sources for the two major growing seasons, 1992 A and B

Class	Season A Kg	% of seed sown *	Season B Kg	% of seed sown
Poor				
Own stock	7.5	44.7	5.8	28.1
Market	8.0	47.9	14.7	69.5
Medium				
Own stock	29.6	82.6	27.1	62.2
Market	5.4	15.0	14.3	33.8
Rich				
Own seed	76.2	97.6	60.0	70.4
Market	2.6	3.2	16.8	20.2
Average				
Own stock	33.7	83.8	28.1	61.5
Market	5.4	13.4	15.0	32.8

*Totals do not add to 100% as other sources contributed small amounts to farmers' seed acquisition

Table 6: Burundian farmers' definition of "good seed" (N = 295)*

Criteria**	# Responses	% Responses	% Farmers
Varietal factors	422	65	90.2
Small grained			
Good yield			
Known variety			
Seed sorting			
Rotten, immature, broken grains eliminated	144	22	41.7
Bruchid-damaged grains eliminated			
Economic factors			
Grains "economic to sow" (small)	35	5	9.8
Conditioning	25	4	7.8
Good germination			
Appropriate moisture content			
Seed health	18	3	5.8
Other	2	<1	0.7

* Farmers permitted to cite up to three criteria.

** Each of the categories represents a cluster of responses: Thus varietal reasons includes such criteria as desire for "small-seeded varieties", early-maturing varieties, varieties that resist drought, and so on. The major criteria have been listed under each aggregate entry.

Table 7: Rwandan qualitative assessment of major seed sources

Source	Market: general category	Small local merchant	Large mer- chant	Neighbor
<u>Positive attributes</u>				
Good genetic quality	+	+		+++
Good physical quality				++
Appropriate storage				+
Easy availability	+	+	+	
<u>Negative attributes</u>				
Poor genetic quality	-	-	--	
Poor physical quality	-	-	-	
Expensive	-	--	-	--
Erratic availability (scarcity)				--
Inexact quantities (Client "cheated")		-	-	

- Each mark, whether negative (-) or positive (+) represents close to a third of the respondents who cited the source.