The Role of Potato and Sweetpotato in Disaster Relief: The Case of Rwandan Refugees in South Kivu, Democratic Republic of the Congo (ex-Zaire), 1994-96

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After the civil war and associated genocide in Rwanda in June and July, 1994, over one million refugees streamed over the border into neighboring areas of Zaire, a country whose new government has since changed its name to the Democratic Republic of the Congo. This area around the Great Lakes is one of the poorest and most densely populated in all of Sub-Saharan Africa. Prior to the outbreak of violence, Rwanda and then Zaire had estimated per capita incomes of US$265 and US$327, respectively (World Bank, 1992). In response to the human tragedy in 1994, refugee camps were set up under the auspices of several branches of the United Nations and a number of non-governmental organizations (NGOs). The displaced population lived in these camps for a little over two years, until they were dispersed in October 1996. Some went back to Rwanda, their home country. Others fled to locations deeper into the D.R. of the Congo. Five camps were set up near the town of Bukavu, at the southern tip of Lake Kivu (Figure 1). The agroecological conditions, farming systems, and dietary habits of the local population are very similar to those across the border in Rwanda. The refugees' presence generated a huge increase in the local demand for food. They also constituted a massive pool of hired labor for local farmers. Their presence led to a surge in the production of both potato and sweetpotato, important crops historically on both sides of the border (Scott, 1988; Tardiff-Douglin, 1991).

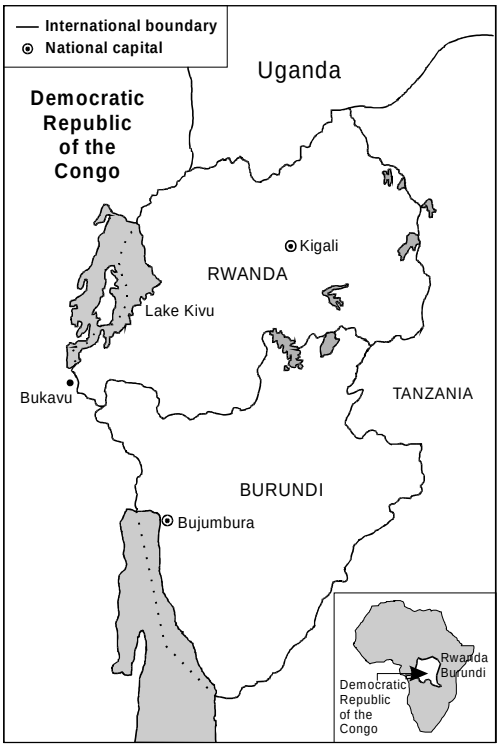

Figure 1. D.R. Congo, Rwanda, and Burundi showing Bukavu, near the five refugee camps.

Materials and Methods

The national potato and sweetpotato programs of INERA, the national agricultural research institute of D.R. of the Congo, are based at the Mulungu Research Station just outside Bukavu. The programs are part of the PRAPACE network, and have rou-

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tinely received advanced germplasm and training from CIP for the past 20 years (Ewell, 1992; Rueda et al., 1996). Improved cultivars and other tested technologies were locally available. One of the refugee camps was located right on the edge of the station; others were in the immediate vicinity. The station became involved in the multiplication of planting material for local farmers, who sold their harvest directly to the refugees as well as to the relief agencies. Given these dramatic developments, researchers at Mulungu were interested in analyzing the response of local growers to these events. Among the key considerations was a better appreciation for local farmers' ability to respond quickly to upheavals in supply and demand for food, to begin to quantify the extent of this response, and to examine the role of new technology in these adjustments. To that end, a total of 128 farmers in the immediate surroundings of five refugee camps were interviewed about the impact of the crisis on local agriculture and food supplies during April and May, 1998 (Tanganik and Phezo, 1998).

Results and Discussion

The local farmers are predominantly members of the Mushi tribe. The highlands of South Kivu are mountainous, and agricultural land is located between 1,400 and 2,500 m. The predominant crop is banana, consumed primarily as local beer. The major staple crops are sweetpotato, beans, maize, cassava, and potato (Table 1). Sweetpotatoes are known as *cilera abana*, or "protector of the children", and are universally grown on a small scale for food security. Potatoes are widely grown as a cash crop, mostly by richer members of the community, in drained swamps along with other vegetables. Farmers were able to rapidly intensify production of both crops to sell to the refugees.

Potato

Most farmers increased their cropping intensity from one to two or even three crops a year (Table 2). Over half of the farmers interviewed decreased the area planted to other crops to increase potato production, at the expense of beans, maize, cassava, and sorghum. Two-thirds of them adopted new culivars. Cruza 148 (720118) was introduced into the region from Mexico in the late 1970's. It is relatively high yielding, resistant to late blight, and tolerant to bacterial wilt. Adoption has been limited by its relatively poor culinary quality that makes it difficult to market (Rueda et al., 1996). This was obviously not a major issue for the refugee market, and it quickly became the most widely grown. Other established cultivars Montsama (720049) and the Rwandan selection Mabondo were also adopted. Seed was obtained from the Mulungu research station, from agricultural extension agents as well as from NGOs. In some camps, seed was obtained from the refugees themselves, who had carried it from their homes in Rwanda.

The availability of refugees as laborers encouraged local farmers to adopt relatively labor-intensive practices. These included heavy mulching at planting, deep tillage, the preparation and application of organic compost, draining of swampy plots, and higher hilling. Over half of the farmers increased the use of fungicides to control late blight, and 42 percent rogued out diseased or other suspicious plants to improve the quality of their seed (Table 2).

Sweetpotato

The presence of a ready market encouraged a noteworthy increase in the number of plantings of sweetpotato by nearly all of the farmers interviewed, even more so than potato (Table 2). Eighty six percent of them went from one to two plantings per year, and reduced the areas dedicated to maize, beans, peanuts and vegetables. Over half of them planted new cultivars available on the Mulungu station—again even slightly more so than in the case of potato. The new cultivars had been selected primarily for earliness and high yield. Karebe II and Mugande are regional farmers' cultivars

Table 1. Sampled households reporting major annual crops in areas surrounding refugee camps in the Democratic Republic of the Congo before arrival of Rwandan refugees in July 1994.

	Site					
	Mulungu[a]	Bugobe	Kalehe	Ludaha	Nyangezi	Total
Altitude (m)	1,850	2,000	< 1,800	1,965	1,500	
Sample size	32	22	24	28	22	128
Households reporting production (%)						
Crop						
Sweetpotato	100	100	100	100	100	100
Beans	100	82	92	79	91	89
Maize	100	82	50	100	82	83
Cassava	100	64	100	21	100	77
Potato	100	100	25	100	0	65
Vegetables	19	82	50	71	19	48
Soybean	50	37	67	21	37	42
Sorghum	31	72	37	21	45	38
Peanut	19	0	83	0	36	27

[a] Mulungu is the research station of the Institut National d'Etudes et de Recherches Agricoles.

initially identified as superior by the Rwandan research program. Yanshu 1 is a very high yielding and early Chinese cultivar, which is normally scored as marginal by taste panels in Africa. Mulungu I is a local Congolese farmers' cultivar recently identified as superior by researchers. Benikomachi is a Japanese cultivar with relatively low yield but excellent taste. The low emphasis by farmers on the better tasting Benikomachi and the acceptance of the Yanshu 1 are indicative of the willingness of the market to accept cultivars with relatively low culinary quality (Yanshu 1) during the refugee crisis.

Planting material was obtained from the research station, extension agencies, and NGOs and again in some cases from the refugees themselves. Again, agricultural farmers used refugee labor to intensify production through heavy mulching at planting, the preparation and use of organic compost, better ridging, deep tillage, and draining swampy areas. Overall the movement toward improved agronomic practices was more pronounced than potato (Table 2). Insecticides were the only purchased input mentioned, but only by eight percent of the farmers.

Conclusions

The increased income from the sale of potato and sweetpotato was used to increase the wealth and status of the farmers. Dowries, livestock, home improvements, and consumer items such as bicycles and radios were the most commonly mentioned. School fees and improved diet and health for their families were rated as somewhat less important, which may imply that the most basic needs of these farm households were already met.

The departure of the refugees meant that the extraordinary surge market demand returned to pre-crisis levels, and labor was no longer so easily available. About half of the farmers said that they lost money in the season when the Rwandans left, but this may also have been partially due to the

Table 2. Impact of the presence of Rwandan refugees on potato and sweetpotato production in areas surrounding refugee camps in the Democratic Republic of the Congo, 1994-1996.[a]

	Mulungu[b]		Bugobe		Kalehe		Ludaha		Nyangezi[c]	Total	
Altitude (m)	1,850		2,000		< 1,800		1,965		1,500		
Sample size	32		22		24		28		22	106	128
	P[d]	S[d]	P	S	P	S	P	S	S	P	S
Farmers responding (%)											
1. Increased number of plantings per year?											
No	0	6	9	0	17	8	0	0	18	6	6
From 1 to 2	94	98	91	100	65	83	86	86	82	84	86
From 1 to 3	6	13	0	0	18	8	14	14	0	10	7
2. Reduced other crops to grow more potato?											
No	25	19	0	18	0	8	0	21	18	6	17
Yes[e]	69	-	82	-	17	-	36	-	-	51	-
Less beans	38	50	28	28	0	17	14	21	28	20	29
Less maize	25	25	0	19	17	67	14	21	19	14	43
Less cassava[f]	6	-	27	-	0	-	0	-	-	8	-
Less sorghum[f]	6	-	19	-	0	-	7	-	-	8	-
Less peanut[g]	-	0	-	19	-	17	-	14	27	-	15
Less vegetables[g]	-	6	-	27	-	8	-	7	9	-	12
3. Adopted new cultivars?											
No	69	50	64	45	75	100	64	14	73	68	56
Yes	13	50	36	36	25	0	36	57	27	28	34
Cruza (P) / Karebe II (S)	13	31	82	27	100	0	100	36	18	74	22
Montsama (P) / Mugande (S)	13	38	91	9	0	0	85	29	27	47	20
Mabondo (P) / Yanshu I (S)	0	35	82	9	0	0	21	30	26	10	20
Murhula (P) / Mulungu I (S)	13	19	9	0	0	0	14	0	18	9	7
Enfula (P) / Benikomachi (S)	0	6	9	0	0	0	14	0	0	6	1
4. Where seed obtained?											
Research station	100	94	72	55	0	0	100	7	72	68	45
Extension/NGO	35	0	45	36	42	0	64	43	27	47	21
Refugees	0	0	0	9	100	17	0	40	0	5	13
5. More intensive practices adopted?											
Mulching at planting	94	75	100	100	25	92	100	100	100	80	97
Deep tillage	88	19	100	100	13	100	100	100	100	75	83
Organic compost	75	75	100	100	13	100	100	100	100	72	95
Drain swamps	19	63	45	55	25	50	86	79	55	65	60
More hilling/plant on ridges	56	63	90	100	25	92	86	100	100	64	91
Fungicides/insecticides	44	6	81	0	13	0	79	0	9	54	8
Negative selection[f]	56	-	82	-	17	-	14	-	-	42	

a. Data collected April and May 1998.
b. Research station of the Institut National d'Etudes et de Recherches Agricoles, South Kivu, Democratic Republic of the Congo.
c. Additional area studied for sweetpotato production only.
d. P = potato, S = sweetpotato.
e. 'Yes' response not documented for sweetpotato production.
f. Applicable for potato production only.
g. Applicable for sweetpotato production only.

effects of the civil war in D.R. of the Congo that broke out against then President Mobutu at the same time. Nearly 100 percent of the respondents said that they immediately reduced the area planted to both crops. Nevertheless, a majority reported that they have continued to benefit from the improvements made in their farms during the upheaval, and that they continue to use improved practices to maintain higher yields than before. The major problems are shrunken market and lower prices. Local labor is available, but requires payment in cash, whereas Rwandan refugees would accept payment in the form of food.

This case study illustrates that new cultivars and labor-based technologies to improve the productivity of the farming systems are available in the region, and that they can be adopted rapidly by large numbers of farmers. The wider and more rapid adoption of yield-enhancing technologies is constrained by the size of the local market and limited effective demand and to some extent by the supply of affordable labor. Furthermore, in many areas of Sub-Saharan Africa, wars and natural disasters unfortunately seem likely to continue in the foreseeable future. Both potato and sweetpotato will have important roles to play as short-season, nutritious, locally available foods. CIP and PRAPACE will continue to work with partners and donors to make them available as quickly and efficiently as possible emergency situations, while simultaneously pursuing a longer-term strategy to expand and diversify more permanent commercial opportunities for these commodities.

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