African Crop Science Journal, Vol. 25, No. 3, pp. 321 - 332
Printed in Uganda.
ISSN 1021-9730/2017 $4.00

DOI: http://dx.doi.org/10.4314/acsj.v25i3.6

EFFECTIVENESS OF COMMUNITY BASED SEED MULTIPLICATION IN ENHANCING FARMERS' KNOWLEDGE AND ACCESS TO IMPROVED BEAN SEEDS IN WESTERN UGANDA

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(*Received 28 June, 2016; accepted 21 July, 2017*)

ABSTRACT

Community Based Seed Multiplication (CBSM) approaches have been used by agricultural research and development actors to improve farmers' access to quality seed in many developing countries. CBSM can be private or public driven. However, ways of designing the CBSM for optimum effectiveness under public and private contexts are not well understood. This study was conducted to explore the effectiveness of public sector driven CBSM and factors influencing farmers' access to improved bean seed. The study was conducted in Kamwenge District, western Uganda. An expost facto post-test only design was used to compare the knowledge and accesss outcomes for membership and non-membership farmers. Data were collected from 249 respondents, using a structured questionnaire. Ordered probit regression was used to assess factors which influenced farmers' access to improved bean seeds. Results indicated that Public sector driven CBSM had a significant positive effect (P=0.000) on farmers' knowledge at ($P \leq 0.05$) and access to improved bean seeds. Farmers' access to improved bean seeds was positively influenced by income obtained from beans (P=0.011), distance from farm to the nearest bean market (P=0.036). The CBSM was more beneficial to membership farmers in remote areas compared to those closer to formal seed markets. We recommend that a public sector driven CBSM should target all farmers directly, most especially those in remote areas who lack access to commercial seed outlets.

Key Words: Africa, seed systems

RÉSUMÉ

Les approches de la Multiplication Communautaire Des Graines (CBSM) ont été utilisées par les acteurs de recherches agricoles et du développement pour améliorer l'accès des agriculteurs aux semences de qualité dans plusieurs pays en développement. CBSM peut être privées ou publiques. Cependant, les manières de concevoir les CBSM pour une efficacité optimale dans les contextes publics et privés ne sont pas encore bien comprises. Cette étude était conduite pour explorer l'efficacité du secteur public utilisant les CBSM et les facteurs influençant l'accès des producteurs aux semences des variétés améliorées du haricot. Cette étude était conduite dans le district de Kamwenge, dans l'Ouest d'Ouganda. Le design basé sur expost facto post-test était utilisé pour comparer la connaissance et les revenus de l'accès pour les agriculteurs membres et non membres. Les données étaient collectées sur 249 répondants, en utilisant un questionnaire structuré. La régression ordonnée de Probit était utilisée pour évaluer les facteurs qui influencent l'accès des producteurs aux semences du haricot amélioré. Les résultats ont indiqué que le secteur public utilisant les CBSM a un effet significatif positif (P=0,000) sur la connaissance des producteurs (P<0,05) et l'accès aux semences du haricot amélioré. L'accès des producteurs aux

semences du haricot amélioré était positivement influencé par le revenu obtenu du haricot (P=0,011), la distance du champ au marché plus proche du haricot (P=0,036). Le CBSM était plus bénéfique aux producteurs membres des milieux reculés que ceux proches du marché formel de semences. Nous recommandons qu'un secteur public conduisant CBSM se focalise sur tous les producteurs directement, plus spécialement ceux-là dans les milieux reculés qui manquent d'accès aux exutoires de semences commerciales.

Mots Clés: Afrique, Systèmes de semenciers

INTRODUCTION

Seed is one of the most important agricultural inputs as it carries the genetic information of the crops, thus dictating on the ultimate productivity of other inputs (Mugonozza, 2001). Use of good quality seed varieties is widely recognised as fundamental to ensuring increased crop production and productivity. Other potential benefits accrued to farmers from good seed include high yield index, reduced risks from pest and disease pressure, and high incomes (FAO, 1999). The availability of quality seed to farmers is, therefore, key to food security and agricultural development, especially in Sub-Saharan Africa.

According to Witcombe *et al.* (2010), farmers' access to improved seeds of self-pollinating crops like beans, can be accelerated by a Community Based Seed Multiplication (CBSM) approach. The approach involves organising individual farmers and their support organisations into small seed production units to encourage social learning, supply of quality seeds for farmers' own use, and for seed marketing to other farmers (Omega and Rossiter, 2011).

Effective CBSM approaches, enhance farmers' knowledge and access to improved seed for both the CBSM membership and non-membership farmers through social learning. The approach has been reported to improve seed access in Nepal (Koirala *et al.*, 2004); and to increase access to bean seed in Ethiopia (Katungi and Gebeyehu, 2011). CBSM structures differ significantly in different countries, for instance, the Lucrative Legumes Project (LLP) structure in Kenya, had the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) as the source stakeholders, followed by seed companies, farmers' associations, farmers' groups and the individual seed growers respectively (Mburu *et al.*, 2008). In Tanzania, ICRISAT was the top-most stakeholder in the structure which trained the primary schools teachers who received seed for multiplication and distribution in rural communities after harvest (Monyo and Mgonja, 2003); while in Zimbabwe and Tanzania the Ministries of Agriculture worked directly with two to three progressive farmers, selected from each village, to act as seed distributers in their respective villages (Monyo *et al*., 2003).

CBSM approaches, where multipliers return twice the amount of planting material received for redistribution and further multiplication have been found effective in Sudan (Osman, 2007).

CBSM can be private or public driven. However, the design should ensure that groups prepare suitable mechanisms for the storage and utilisation of the large quantities of seed that become available as pay back to other members (FAO, 2007). Other CBSM approaches like the rural primary schools in Tanzania relied on field-days for wider coverage (Monyo *et al*., 2003); this strategy being informed by the social learning theory which postulates that individuals can learn from observing other people's activity (Rogers, 2010). However, several studies (Koirala *et al.*, 2004; Katungi and Gebeyehu, 2011; Kurmar *et al.,* 2011), show improved farmers' access to seed, but little is known about the CBSM effect to farmers' knowledge.

Unlike in Uganda, the CBSM in Ethiopia, Tanzania and Kenya was spearheaded by the

private sector, which supplied seed, trained farmers and offered supervision during seed production (Katungi and Gebeyehu, 2011; Mburu *et al*., 2008). The privately driven CBSM is characterised by provision of minimal inputs on a cost-sharing basis; while the public driven is characterised by free inputs and other services (Osman, 2007)

In Uganda, CBSM implementation was in contrast, externally induced by the Alliance for a Green Revolution in Africa (AGRA), and spearheaded by the public sector through the National Agricultural Research Organisation (NARO); through provision of free inputs, and training of farmers' groups. It aimed at increasing access to improved bean seed first for direct beneficiaries, and later by scaling out to other farmers in the community through farmer field-days.

Bean is an important crop in Uganda, whose annual output value is US$244.02 million; accounting for 6.1% of the total National Agricultural Gross Domestic Product (FAOSTAT, 2009). Bean production in Uganda, however, declined over the last decade, as a result of stress factors in farmers' fields; the most important ones being Bean Anthracnose, Root rot and draught (Mauyo *et al.*, 2007a). According to MAAIF (2010) the mean yield fell by 64% from 988 to 358 kg ha^{-1} during an eight-year period between 1999 and 2006. Bean Anthracnose resistant varieties were developed, but farmers had little or no access to them (Nkalubo *et al.*, 2010).

Public sector driven CBSM, was therefore designed by NARO to increase farmers' access to these bean seed in many districts of Uganda (Nkalubo *et al.,* 2010). However, the efficacy of the public sector driven approach, as implemented in Uganda's context, and factors influencing its performance were not yet fully documented. This study was undertaken to assess the extent to which CBSM improved farmers' (both members and non-members) knowledge and access to improved bean seed in Kamwenge District.

METHODOLOGY

The study was undertaken in Western Uganda, in Kamwenge District, which is located at 00°11'N, 30° 27'E. The district is mainly rural, with agriculture as the main economic activity. The major crops grown include grains like beans and maize, which are predominantly intercropped. Kamwenge district was selected as one of the first districts to participate in CBSM. Other western Uganda districts, that participated in CBSM include; Kisoro, Kabarole and Mbarara. Since 2008, CBSM was implemented by NARO through a three year project called, *''Sustainable Community Based Farmer-Led, Bean Seed Enterprises for improved incomes and Livelihoods"* with the objective of increasing the availability of improved bean seed to rural poor farmers (Ugen, 2012).

During its implementation, farmer groups were provided with improved bean seeds and their fields served as seed multiplication plots. In subsequent years, NARO provided similar amounts of bean seed to the same farmers' groups. In addition, the CBSM farmers were encouraged to save some seed to supplement NARO's support. They were also trained in good agronomical practices to ensure quality seed at harvest. The average quantity of improved bean seeds sold per selected farmer group of 15-20 members was 3,370 kg in 2009 which represented 80 percent of total harvest in the district (Ugen, 2012). A good number of farmers were trained through their groups during a three year period.

Sampling procedure. Multi-stage, purposive and random sampling techniques were used. In the first stage, Kamwenge district was selected in western region; while the second stage, four sub-counties were selected in the district. In the third stage, one parish per sub-county that participated in CBSM was selected while in the fourth stage, two villages were selected to include; one that had participated

in CBSM and another that had not participated. The sub-counties and parishes were selected with the help of local leaders, who were knowledgeable about CBSM activities in the district.

At village level, respondents were randomly selected using lists of households obtained from extension workers and local leaders. A total sample of 256 respondents from five groups; 32 from each of the selected villages, was selected. However, only 249 respondents; 130 members of CBSM groups and 119 non-members were included in the study because some questionnaires were discarded as they were incomplete.

Research design. An ex-post facto post-test only research design was used to collect data, two years after the CBSM had been implemented in Kamwenge, district. Two categories of farmers, namely; members of CBSM groups that directly participated and non-members that had not participated in CBSM, were compared for knowledge on identification of improved bean varieties, and agronomic practices using a t-test. Selection bias was minimised by ensuring that the two categories were drawn from the same population with similar characteristics. Therefore, any observed differences would be due to CBSM as specified by Walklate (2012). Factors influencing farmers' access to bean seed were determined using the Ordered Probit Model.

Data collection. The data were collected in two phases. In phase one, Key Informants interviews were held with 10 respondents, purposively selected because of their knowledge of CBSM. These included two sub-county National Agricultural Advisory Services (NAADS) Coordinators, two crop extension service providers, two National Agricultural Research Organization (NARO) staff and four farmer group leaders. Phase two involved collection of data by trained enumerators using a pre-tested structured questionnaire.

In this paper, we define effectiveness as ability to enhance farmers' knowledge and access to seed. Knowledge was determined by the farmers' ability to describe new bean varieties, mention practices required in the production of good quality seed and maintenance of genetic purity. Therefore, to determine the effect of CBSM on farmers' knowledge, respondents were asked to identify different bean varieties, describe the beans general agronomical practices, mention post harvest handling techniques and how to maintain genetic purity. The knowledge of agronomic practices for bean management by CBSM group members and non-members was determined by subjecting them to a set of questions. Access to seed was determined by the farmers' sources of seed and varieties grown before and after inception of CBSM in the district.

Data analysis. Data were analysed using the Statistical Packages for Social Scientists (SPSS) computer package (Version 16) for descriptive and inferential statistics. In order to assess the factors that influenced farmers' access to improved bean seed, an Ordered Probit regression model was performed using Stata 12 software. The Model was specified as follows:

$$Y_i = \alpha_i + \beta_{1i}PART + \beta_{2i}GEND + \beta_{3i}AGE + \beta_{4i}EDUC + \beta_{5i}DIST - HE + \beta_{6i}INBEAN + \beta_{7i}ACCESS + É \ldots\ldots\ldots\ldots\ldots \text{Equation 1}$$

Where:

Y_i= level of respondent's access to improved bean seed. Y was scored as follows:

$Y_{i=}$ 1 if the extent to CBSM's increase in respondent's access to improved bean seed is low;

$Y_{i=}$ 2 if the extent to CBSM's increase in respondent's access to improved bean seed is medium; and

Y_i= 3 if the extent to CBSM's increase in respondent's access to improved bean seed is high.

Also, α_i = constant, PART = dummy variable equal to one if respondent was a member of CBSM group and zero if not, GEND = respondents gender, AGE = the age of the household head, EdUC = the highest level of education of the household head, DIST HE = the distance from the household to the nearest bean market, INBEAN = the income obtained from beans, ACCESSIT = the access to credit by the household and É is the error term.

RESULTS

Effect on farmers' knowledge. K132 was the most recognised bean variety by members and non-members of CBSM groups in western Uganda (Table 1). The variety was recognised by over 90% of both categories of farmers, and named by 44.9% of the members and 17.7% non-members. NABE 4 was the second variety to be recognised. Overall, members of CBSM groups were more knowledgeable about the varieties than the non-members (Table 1).

Varieties NABE 13 and NABE 12C were the least identified, having been named by less than 20% of the members and 1% of the non-members (Table 1). Generally, there was limited capacity of respondents, both members and non-members, to name the different bean varieties; some of which they could recognise as improved (Table 1). The limited capacity was more pronounced among the non-members, especially in identifying NABE 14 bean variety. Majority of the respondents (59.7%) in this group recognised it as an improved variety, but very few (1.8%) were able to mention its name.

TABLE 1. Proportion of respondents who correctly identified the different bean varieties in Kamwenge district in Western Uganda

Bean variety	Members of CBSM (n=130)	Non-members (n= 118)
	Percentage	Percentage
$K132^R$	92.2	91.3
$K132^n$	44.9	17.7
NABE 4^R	75.0	55.3
NABE 4^n	41.7	11.5
NABE 14^R	77.3	59.7
NABE 14^n	20.6	1.8
NABE 13^R	14.3	0.9
NABE 13^n	13.4	0.9
NABE $12C^R$	19.4	1.8
NABE $12C^n$	16.7	0.9

R = proportion of farmers who could recognise that it is an improved variety, n = proportion of farmers who could name the variety. CBSM = Community Based Seed Multiplication

General agronomic practices. Table 2 shows the mean scores on knowledge of agronomic practices by members and non-members of CBSM. The maximum possible overall score was 30 and the minimum is zero. There was a significant difference ($P<0.01$) in knowledge score for the members of CBSM and non-members ($P=0.000$), with an overall mean score of 25.3 and 20.9, respectively (Table 2). There was a significant difference between members and non-members in knowledge of improved bean spacing, time for weeding, maintainance of seed purity, advantages of group marketing and the best place for beans storage (Table 2). It is noteworthy that these were practices core to production of bean seed, and the CBSM training gave greater knowledge advantage to membership farmers over non-membership farmers.

Members and non-members obtained 2.96 and 2.86, respectively, for mentioning the right time of planting as the highest scores (Table 2). The least scores were observed in mentioning the right spacing; 1.76 for members and 0.59 for non-members.

There was no significant difference between members and non-members for knowledge of pests and diseases; identification of the properly dry bean seed, and right time of planting (Table 2). However, the mean

TABLE 2. Scores of knowledge of agronomic practices by members and non-members of Community Based Seed Multiplication groups for bean varieties in Kamwenge district in western Uganda

Practice	Mean score		Independent t-values	P-value
	Members n=129)	Non-members (n=117)		
Overall test score	25.30	20.90	9.543	0.000***
Individual knowledge item test score				
Right time of planting beans	2.96	2.89	1.794	0.074
Right spacing of beans	1.76	0.59	9.614	0.000**
Right time for first weeding of beans	2.69	1.99	5.862	0.000**
Mentioning of at least two bean diseases	2.25	2.21	0.382	0.703
Mention at least two bean pests	2.42	2.25	0.895	0.372
Control of bean weevils	2.84	2.71	1.899	0.059
Ways one can tell that a bean seed is dry	2.69	2.61	0.953	0.341
How to maintain the seed purity	2.39	2.06	2.753	0.006**
Advantages of group marketing	2.62	1.52	8.726	0.000***
Best place for bean storage	2.61	2.52	2.931	0.004**

CBSM = Community Based Seed Multiplication; **Significant at 1%

score on these agronomic practices were high compared to the scores on right spacing of beans. Respondents' sources to knowledge are summarised in Figure 1.

The main source of knowledge on the bean management practices for members was NARO, through the CBSM (77.8%). The other source of knowledge mentioned included; traders, spouses, NGOs and common knowledge.

Access to improved bean varieties. Majority of the farmers obtained improved bean seed as a result of the CBSM (Table 3). Two improved varieties (K132 and NABE 4) were grown by respondents before the introduction of CBSM project in the area. In contrast, the other improved varieties (NABE 12, 13, 14, 15 and 25) were only grown after introduction of CBSM in the study areas.

Table 3 shows that K132 was the most common improved bean variety grown by farmer (members and non-members) after the introduction of CBSM, followed by NABE 4. Majority (78%) of the respondents who grew improved bean seed obtained it as a result of the CBSM (Table 4).

At the time of introduction of CBSM in 2008, majority of its members got bean seeds through CBSM; while majority of the non-members obtained it from an NGO known as "Samaritans, Purse". In 2014, CBSM members obtained seeds from varied sources, with the market being the major source. There was also increase in the market sources of seed for the CBSM members. For the non-members, there was a remarkable increase in neighbours being the source of seed, although the NGO remained the biggest source of seed.

Factors affecting access to improved bean seeds. Descriptive statistics on the explanatory variables show that females were more than males, for CBSM group members and non-members (Table 5). On average, both members and non-members had five years of schooling. However, the membership farmers had slightly higher income levels compared to non-membership farmers.

Results for the factors that influence farmers' access to improved bean seed are reported in Table 6. The factors which were significant included; income obtained from beans, membership in CBSM and distance

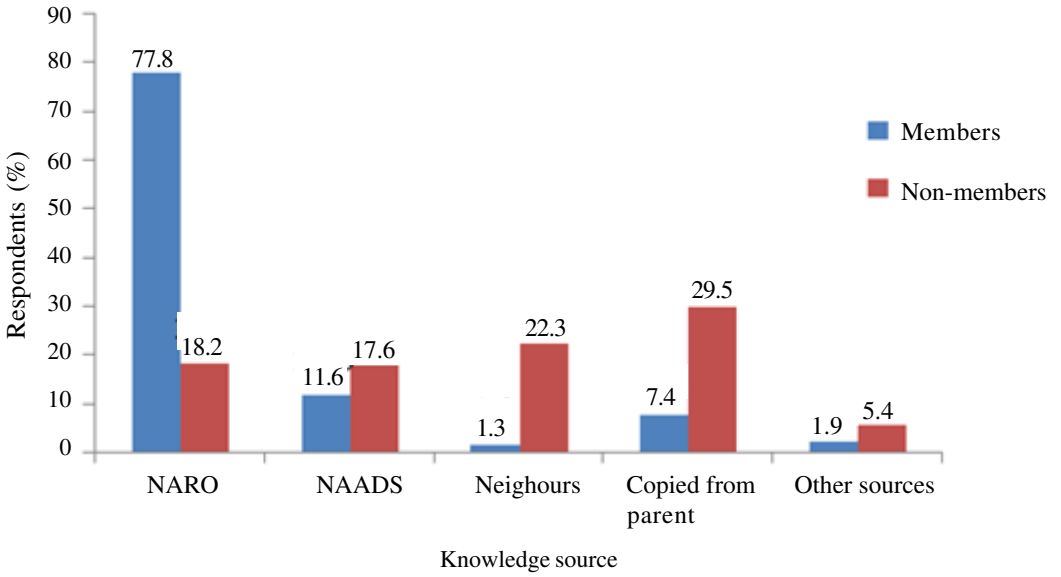

Figure 1. Sources of knowledge of the bean management practices in Kamwenge district in western Uganda.

NARO = National Agriculture Research Organisation; NAADS = National Agriculture Advisory Services

TABLE 3. Proportion of respondents who grew improved bean varieties in Kamwenge district in western Uganda before and after the Community Based Seed Multiplication

Variety grown	CBSM members		CBSM non-members	
	Before 2008 (%)	After 2014 (%)	Before 2008 (%)	After 2014 (%)
Kanyobwa	13.1	0.0	18.6	0.8
Rushare	17.4	0.0	15.1	0.0
Ndemeye	12.3	7.1	11.5	11.2
K20	14.7	5.5	14.4	13.4
Kayora	10.1	0.0	13.5	0
Kazarirahamwe	8.3	0.0	9.5	0.8
Nkaijakwanama	7.2	3.2	6.1	3.9
Rwemereza	3.7	0.0	3.4	0.0
K132	23.8	80.8	30.5	71.2
NABE 4	6.9	50.0	5.9	13.6
NABE 12C	0.0	10.8	0.0	2.5
NABE 13	0.0	3.1	0.0	3.4
NABE 14	0.0	7.7	0.0	2.5
NABE 15	0.0	17.7	0.0	1.7
NABE 25	0.0	2.3	0.0	0.0

TABLE 4. Respondents' sources of improved bean seed within the members and non-members of CBSM in Kamwenge district in western Uganda

Sources of improved beanseed used by respondents	Members n=130		Non-members n=118	
	Source of seed in 2008 (%)	Current source of seed in 2014 (%)	Source of seed in 2008 (%)	Current source of seed in 2014 (%)
CBSM group member	78.1	21.9	29.8	11.2
NAADS	3.8	15.5	2.9	1.2
Neighbours	6.7	17.9	1.9	13.8
Own Seed	0.0	1.2	0.0	0.0
NGO (Samaritans purse)	4.8	2.4	53.8	56.2
Farmers not members of CBSM	4.8	1.2	0.0	1.2
Market	2.0	34.5	11.5	16.2

NAADS = National Agriculture Advisory Services, CBSM = Community Based Seed Multiplication, NGO = Non Government Organisation

from household to nearest bean market. Increase in incomes from beans by one unit increased access to bean seed by 8%; while an increase in the distance from farm to the formal bean market of 1 Km was associated with 6% increase in access to improved bean seed. Membership to a CBSM group increased access to improved bean seed by 47.8%. Other variables, namely, gender, farmers' age, education; total land size and access to credit were not significant (P>0.05) (Table 6).

DISCUSSION

Effect on farmers' knowledge. The findings that a big percentage of farmers, both CBSM members and non-members, were able to recognise K132 (Table 1) is largely because the variety was grown by farmers prior to the implementation CBSM (Table 3). On the other hand, farmers' failure to identify a variety implies that, their knowledge was not adequately enhanced for that particular variety.

The low knowledge scores observed for the right spacing (Table 2), imply that farmers lacked the knowledge on the right spacing of beans. Therefore, farmers were likely to obtain less yields from their fields since sufficient spacing between plants and rows is vital to avoid competition and obtain maximum yield (Alemitu, 2011).

High mean scores on the agronomic practices of pests and diseases; properly dried bean seed, right time of planting and the best place for bean storage, implied that farmers (both members and non-members) had high knowledge on these aspects. The importance of these particular practices could have motivated farmers to take the initiative to master them in order to avoid losses.

Farmers' access to improved bean varieties. The shift from local to improved varieties, for both CBSM group members and non-members (Table 3) shows that these varieties substituted for local varieties and that, CBSM increased their availability to farmers. As Marek and Grzesiuk (2015) noted, diffusion

TABLE 5. Descriptives (variable means and standard error) for access to improved bean seed among bean farmers in Kamwenge district in western Uganda

Variable	CBSM Group members (n=130)	Non-members (n=118)	P-values
Categorical variables			
Gender			
Male	40	33.9	0.323
Female	60	66.1	
Income levels (US$)			
Less than 89	12.1	22.22	
Between 89-297	33.06	37.61	0
Between 297-892	17.71	23.93	
Above 892	37.1	16.24	
Access to credit		70.16	39.29
Continuous variables			
Age	45.9(11.41)	42.0(12.16)	0.011
Education	5.4(4.09)	5.3(5.85)	0.85
Distance from household to nearest bean market	1.5 (2.15)	1.77(1.74)	0.036

CBSM = Community Based Seed Multiplication; values in brackets represent standard errors

TABLE 6. Factors influencing to farmers' access to improved bean seed in Kamwenge district in western Uganda

Variable	dy/dx	z	P>|<|
Membership in CBSM	0.474	7.77	0.000***
Gender	0.321	0.38	0.706
Age	-0.008	-0.23	0.818
Education	-0.006	-0.82	0.014
Total land size	0.008	1.32	0.185
Distance from household to nearest bean market	0.060	2.37	0.017*
Income from beans	0.082	2.54	0.011*
Access to bean credit	0.040	0.52	0.602

* = Significant at 5%, ***Significant at 1%. CBSM = Community Based Seed Multiplication

of knowledge depends highly on members of an organisation and their will to share both codified and personalised knowledge. The CBSM in Kamwenge facilitated knowledge sharing and interactions through field days. These may have attracted non-members leading to the diffusion of knowledge about improved seed to non–members as well. In addition, NGO intervention in seed redistribution from CBSM members enhanced the diffusion of the seed to non-members. Therefore, a strategy of seed redistribution should be incorporated in the design of CBSM. The proportion of non-members who obtained seed from CBSM was dismal (Table 3), implying that membership in CBSM played a significant role in enhancing farmers to improved bean seed.

Improved varieties, K132 and NABE 4, were grown by non-members before the

introduction of CBSM because they were released earlier (Kalyebara, 2005). K132 was released in 1994, while NABE 4 was released in 1999. Other improved bean varieties which were released later are NABE 12C released in 2003; NABE 13 and NABE 14 released in 2006 (Van Mele *et al*., 2011). K132 was dominantly grown by both CBSM members and non-members. CBSM promoted large scale multiplication of locally preferred varieties, the NGO, provided direct access of similar varieties to non-members. The NGO, however, bought these bean seed varieties from CBSM groups because of their availability (Table 4).

The results showing that K132 was the most grown variety, because of its locally preferred attributes including high yielding, good taste and marketability, followed by NABE 4 (Table 4) are consistent with Nasirumbi *et al*. (2008) who noted that farmers in Mpigi selected K132, NABE 4, NABE 5 and NABE 12c because of their yield and resistance to diseases, pests and drought. Waluse (2012) also reported the most grown common bean varieties in Eastern Uganda to be Kanyebwa, K20, K132 and K131, in that order. Earlier on, Kalyebara (2005) noted that K132 was the most widely adopted bean variety in Uganda. His survey results revealed that 53% of the households adopted at least one new varieties; while 40% had adopted K132. He further observed that the adoption of new varieties released in 1999 and later was less than 15% of households. This was mainly attributed to lack of access to seed, because most of them were not yet widely disseminated by 2003.

The results show that farmers who had higher income from beans reported increased access to improved beans (Table 6). Farmers are more motivated to seek out technologies such as improved seed for high value enterprises.Therefore, CBSM is likely to be more effective when implemented with strategies that increase farmers' earnings.

Farmers further from formal bean markets registered a higher access to improved bean seed through CBSM (Table 6). This could be explained by the fact that farmers far from formal markets are more constrained because they cannot access seed easily and are therefore, likely to take advantages of CBSM which brings seeds closer to them. The findings regarding distance from markets are in contrast to the study by Kassu (2009) which showed that farmers who are nearer to markets utilised more inputs than those far away. The CBSM helped to deliver bean seeds to marginal locations where farmers lack proximity to seed markets. Basing on the results, therefore, the CBSM designers should target such farmers.

CONCLUSION

The results of this study show that the CBSM as implemented in Kamwenge was associated with improved farmers' knowledge of and access to improved bean varieties. However, it was more effective for the direct beneficiaries. Farmers' access to improved bean seeds was influenced by; incomes obtained from beans, distance from formal market and CBSM membership. Basing on the results, CBSM effectively improved farmers' agronomic knowledge for bean seed production. This implies that for greater effectiveness of CBSM, farmers should be targeted directly. Designs that aim at achieving a multiplier effect and wider community coverage should not rely on field days alone but would need to incorporate other strategies for promoting an effective seed marketing and distribution system as part of the CBSM. Finally, CBSM should be promoted as an effective approach for enhancing access to improved seed by farmers in remote locations far from formal seed markets.

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