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Full Length Research Paper

Participatory sunflower production, technology dissemination and value addition in Southwest Kenya

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Sunflower is widely adapted and one of the major oil crops grown in Southwest Kenya. It is regarded as a high value cash crop and a source of high quality edible vegetable oil in Kenya. Southwest Kenya lies within the Lake Victoria region and is suitable for sunflower production. During Participatory Rural Appraisals (PRAs) farmers attributed the low production to poor agronomic practices, inadequate pest and disease control, lack of high yielding varieties, decline in soil fertility, shortage of good quality seeds at planting, low producer prices, shortage of sunflower seed for processing, lack of access to credit, lack of markets and market information, weak research - extension – farmer linkages and low adoption of developed technologies. To address some of these constraints, on -farm research activities were undertaken by Kenya agricultural Research Institute (KARI) using participatory research approach targeting small- scale resource challenged farmers who are vulnerable to food and nutritional insecurity. The PRA was favoured because the top-down approach of technology development and dissemination had led to poor adoption of technologies. The objectives of the project were; to scale up promising sunflower varieties, enhance value addition activities and to link farmer marketing groups to existing and new market opportunities. The treatments were; intra – row planting, pure stands (75 x 30 cm and 70 x 30 cm), alternate planting (1 row sunflower and 1 row maize) and two rows sunflower and two rows maize. The results indicate that pure stands had significantly (P 0.05) higher yields of both seed and oil than other treatments. However during farmer evaluation single alternate (1 row sunflower with 1 row maize) was ranked first followed by pure stand (75 x 30 cm) and intra row in a decreasing order. The single alternate row was ranked first based on food security, bird control and income generation since it provides both maize for household use and sunflower as a cash crop. Therefore this technology should be recommended for up scaling to more farmers in the region.

Key words: Sunflower, PRA, scaling up, value addition.

INTRODUCTION

Accessing appropriate technologies in oil crop production by smallholder resource poor farmers is still a major challenge for research and extension providers in Kenya. In the past, many technologies were developed by research institutions with very little input by farmers or extension staff. This led to low adoption and increased poverty levels in the rural areas. If poverty levels are to be reduced and living standards uplifted, then farmers must have access to appropriate technologies to enable them increase agricultural productivity. According to the government of Kenya poverty reduction, strategy paper (PRSP, 2001), one out of every two Kenyan lives below the poverty line defined as just Kshs.1239 (US$15.6) per month. Nyanza Province where the project areas fall (Rachuonyo and Homabay Districts) suffers from extreme rural poverty, which has significantly increased from 42% in 1994 to 70% in 1999. This makes the province have the highest number of people living below the poverty line. In addition, the area has a high level of HIV – AIDS infections as a result of high poverty levels.

Sunflower (Helianthus annuus L.) is one of the major oil crops grown in southwest Kenya. It is regarded as a

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Table 1: Sunflower (HB 8998) evaluation.

Treatments	No. of farmers	Plot Size	Spacing
Intra row with maize	50	10 x 10 m	75 x 30 cm
Pure stand	”	10 x 10 m	75 x 30 cm
Alternate row with maize	”	10 x 10 m	75 x 30 cm
Pure stand	”	10 x 10 m	70 x 30 cm
2 rows sunflower with 2 rows maize	”	10 x 10 m	75 x 30 cm
Pure stand (scaling up)	”	10 x 10 m	70 x 30 cm

high value cash crop and a source of high quality edible vegetable oil (Ministry of Agriculture Rachuonyo and Homabay 1996 - 2001). Southwest Kenya is situated in the lower medium zone (LM_{1-4}) (Jaetzold and Schmidt, 1982), which has suitable climate for sunflower production. However, production is low due to several constraints identified by farmers during PRAs. These include poor agronomic practices, pest and disease control, lack of high yielding varieties, shortage of good quality seeds at planting, low producer prices and shortage of sunflower seed for processing, lack of access to credit, lack of markets and market information, weak research - extension – farmer linkages and low adoption of developed technologies (Rees et al., 1997, Okoko et al., 1998).

To address these constraints; on - farm sunflower research was initiated and undertaken for four years by KARI. After four years of research, farmers identified two sunflower hybrids (HB 8998, HB 7369) and one open pollinated type (Rekord) as suitable for production in the two districts (KARI annual report 1996, 1998 and 2001). Previous work done under International Development Agency (IDA) has shown that growing of disease tolerant, high yielding and early maturing sunflower varieties coupled with value addition, provides highly nutrition edible oil and increase cash income to smallholder farmers, majority of who are women, youths and AIDS orphans. If farmers in the project areas are facilitated through participatory technology development and dissemination to acquire and utilize these technologies, then food security at household levels could be achieved and poverty levels drastically reduced.

Therefore on-farm trials and demonstrations were undertaken with the following objectives; to disseminate and popularize suitable sunflower varieties to more farmers in the region and to bulk seed so as to meet the current demand. The farmer participatory research (FPR) approach aimed at actively involving farmers in all theresearch processes and empowering them to have a greater influence on decision making on the research activities.

MATERIALS AND METHODS

The trials were carried out in Pala village, Kabondo Division, Rachuonyo District. The village is situated in agro-ecological zone (AEZ) upper midlands UM_{2-3} at an altitude of 1200 m above sea level (Jaetzold and Schmidt, 1982). The area receives bimodal rainfall with an annual mean precipitation of 1200 - 1500 mm. The trials were planted in a randomized complete block design (RCBD) with six treatments with farmers serving as replicates. Data was taken on seed yield, oil and cake. The data was statistically analyzed using general linear model SAS package and means were separated using LSD. Only one variety sunflower HB 8998 was grown under six different intercropping systems. This was due to lack of other high yielding varieties. In order to increase sunflower commercial seed production, farmers planted demonstrations in bigger plot sizes of ¼ - ½ acre. Crop treatments applied, plot sizes, spacing and number of participating farmers for each trial is shown on Table 1.

Farms were prepared, trials planted and managed by farmers, while researchers and extension staff provided technical back stopping. Farmers, researchers and extension staff carried out monitoring and evaluation of results jointly. In order to enhance sunflower production training workshops on improved crop management, treatment evaluation and marketing were undertaken during the crop cycle and end of long rains season.

RESULTS AND DISCUSSION

Table 2 shows that pure stand 75 x 30 cm and pure stand 70 x 30 cm had significantly (P 0.05) higher yields of both seed and oil. Pure stand 70 x 30 cm had the highest overall seed and oil yield (seed yield; 1061.2 kg ha^{-1} and oil yield; 255.88 kg ha^{-1}) followed by pure stand 75 x 30 cm with (seed yield; 1007.1 g ha^{-1} and oil yield; 255.29 kg ha^{-1}), while intra row had the lowest seed and oil yield. However, there were no significant differences in cake yield for all the treatments. During end of season workshop (Table 3) farmers' ranked pure stand 75 x 30 cm first followed by alternate, 1 row sunflower with 1 row maize, intra row, pure stand 70 x 30 cm and two rows sunflower with two rows maize was ranked the last. Pure stand 70 x 30 cm was ranked second last because of its small head size and lower oil recovery.

Conclusions

This study has revealed that although sunflower has good potential for commercial production in Southwest Kenya, there are still some challenges such as prolonged dry periods; low acreages leading to shortage of seeds for processing, production is labour intensive, processing

Table 2. Mean sunflower (seed, oil and cake) yields at Kabondo.

Treatment Number	Treatments	Mean yield in kg ha^{-1}		
		Seed	Oil	Cake
1	Intra row	735.3ab	185.00ab	550.3a
2	Pure stand 75 x 30 cm	1007.1ab	255.29a	751.8a
3	Alternate, 1 row sunflower and 1 row maize	690.6b	162.94b	527.7a
4	Pure stand 70 x 30 cm	1061.2a	255.88a	805.3a
5	Two rows sunflower and two rows maize	897.6b	234.12ab	663.5a
	SE	129	264.2	105

Means in the same columns followed by a different letter are significantly different at (P = 0.05) on the basis of LSD.

Table 3. Matrix ranking of Sunflower treatments by 50 farmers in Kabondo.

Farmer criteria	Treatments				
	Intra row	Pure stand (75 x 30 cm)	1 row alternate	Pure stand (70 x 30 cm)	2 rows alternate
Labour requirement	5	3	2	4	1
Growth vigour	2	5	4	3	1
Size of sunflower head	4	5	3	1	2
Seed yield	1	4	3	5	2
Oil yield	2	5	4	1	3
Score	14	22	16	14	9
Overall Rank	3	1	2	4	5

5 = best and 1 = poorest.

machines are gender unfriendly and lack of good quality seed of high yielding varieties at planting time. In addition the ram press is inefficient (releases 32% instead of 40% oil) and this leads to loss of edible oil resulting in oily cakes. Even though recommendations are made, farmers operate in a dynamic environment and their priorities change from time to time based on other socio economic issues.

Recommendations

Due to increase in demand for sunflower seed, farmers should expand their production to more than half an acre for home utilization because they are a good source of nutritious food and quick income generation. However, to sustain production of sunflower, trained project farmers should train other farmer groups in production and processing. Researchers and extension staff should continue training farmers on marketing, farming as a business and utilization of different sunflower products and by-products. There is need to improve the efficiency of the current oil press from 32 - 40% to avoid losses. Also the farmer groups should accumulate enough savings from sale of oil and cake to purchase a more efficient motorized oil press.

Way forward

a) Encourage farmers to cost share in the purchase of inputs (seeds and fertilizers).
b) Sensitize more farmers in the region to plant sunflower. .
c) Encourage farmers to expand acreage under sunflower from 2000 m^2 – 2 acres.
d) Encourage farmers to form marketing associations and increase stock in the grain bank for ease of accessing inputs (fertilizer/certified seed) and through sales of seed, oil and cake.
e) Encourage farmers to start savings and loan to its members after sale of processed products (oil and and cake).
f) Assist farmers to take oil and seed cake samples to Kenya bureau of standards for quality analysis and certification.

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