



Research paper

Economic Evaluation of Improved Faba Bean Yield on Farmers' Fields in Central Darfur State-Sudan

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ABSTRACT

Faba bean is a traditional crop in Central Darfur state. It is the major food crop where it produced as an irrigated winter crop. The crop is also produced as rainfed crop in the plains of the highlands of Jebel Marra and the alluvial plains along the borders with Tchad and Central Africa. This study is an attempt to identify the economic performance of faba bean on farmers yield. The study was conducted in Zalingei locality of central Darfur state during 2017/18 cropping season. Partial crop budget was applied to know cost benefit analysis. Result revealed that productivity of faba bean was found to be 2.5, 2.2 and 1.7 ton per hectare in improved Shendi, Basabeer and local super, respectively. Results also revealed that improved genotypes exceed the local super by 47% and 29% by improved Shendi, Basabeer respectively. Partial crop budget result showed that The highest net returns was obtained by improved Shendi (SDG 43,335) followed with improved Basabeer (SDG 34,950) while the lowest net returns recorded by local super with SDG 30,362. In contrast the highest SDG cost was given by improved Basabeer (17,070) and the lowest obtained by local super (SDG 16,328). Study noted that the net return of local super was lower than that of improved genotype by 43 and 15% for Shendi and Basabeer, respectively. Result also showed that the cost benefit ratio is varied from 1.9 to 2.1 to 2.6. The study recommended agronomic research needed specially in crop water requirement and pests and diseases control for minimizing the production costs and maximizing the economic yield.

Keywords: Faba bean, economic, productivity, partial budget, cost-benefit rate

تقييم الاداء الاقتصادي لإنتاجية الفول المصري المحسن بحقول المزارعين بولاية وسط دارفور، السودان

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المستخلص

الفول المصري من المحاصيل التقليدية التي تزرع في ولاية وسط دارفور حيث يتم إنتاجه بالري شتاء كما ينتج خريفاً في سهول جبل مرة والسهول الطميه على طول الحدود مع دولتي شاد وأفريقيا الوسطى. تعتبر هذه الدراسة محاولة للتعرف على الأداء الاقتصادي للفول المصري المحسن وأثره على غلة المزارعين. اجريت هذه الدراسة بمحلية زانجي للموسم الزراعي الشتوي 2017/18. كما تم استخدام الميزانية الجزئية لتحليل العائدات والتكاليف. أظهرت النتائج أن إنتاجية الفول المصري (طن/هكتار) هي 2.5، 2.2، و1.7 لكل من شندى، بسابير والبلدي السيوير، على التوالي. كما أظهرت النتائج أيضاً أن إنتاجية المحاصيل ذات الصفات الوراثية المحسنة تجاوزت الصنف البلدي السيوير بنسب 47 %، و29 % لكل من شندى وبسابير على التوالي. أوضحت نتائج الميزانية الجزئية أن أعلى عائدات تم الحصول عليها بواسطة الصنف المحسن شندى (43,335 جنيه)، بسابير محسن (34,950 جنيه) بينما الصنف البلدي سيوير أعطى أقل عائدات (30,362 جنيه). على النقيض نجد أن الصنف بسابير أعطى أعلى تكلفة (17,070 جنيه) بينما الصنف البلدي السيوير أعطى أقل تكلفة (16,328 جنيه). أشارت الدراسة إلى أن عائدات الصنف البلدي السيوير أقل من عائدات الأصناف المحسنة لكل من شندى وبسابير بنسب 43 و15 % على التوالي. كما أوضحت النتائج وجود اختلافات في معدل التكاليف للعائدات بمقدار 1.9، 2.1، و2.6 لكل من البلدي، بسابير وشندى، على التوالي. أوصت الدراسة بإجراء مزيد من البحوث في الاحتياجات المائية للمحصول وطرق مكافحة الآفات والأمراض بغرض تقليل تكاليف الإنتاج وتعظيم الإنتاج الاقتصادي.

كلمات مفتاحية: الفول المصري، اقتصاد، انتاجية، الميزانية الجزئية، نسبة التكلفة للمنفعة

Introduction

Grain legumes are an important component of agricultural and food systems in practically all over the world, and serve to complement the cereal crops in several aspects. First in terms of human nutrition, legumes supply a higher percent of protein while cereals are the primary source of calories. The amino acid profile of legume protein tends to complement that of cereals, adding lysine to the diet while cereals had better source of sulfur containing amino acids. Furthermore, legumes are better source of minerals, presenting two or more times the levels found in most cereals. Within the group of legumes having edible seeds, faba bean is the most important. It is originated in the Near east and is one of the earliest domesticated legumes after chickpea and pea. Ethiopia is considered as the secondary center of diversity and one of the nine major agro-geographical production regions of faba bean. China is the leading producing countries followed by Ethiopia (FAO, 2009). At present faba bean is the third most important cool-season food legume in the world. Moreover, it can improve soil fertility through fixing atmospheric nitrogen and provides large cash for producers and foreign exchange for the producing countries (Bekele, 2016).

Faba bean is the most important legume in Sudan; it constitutes the main dish on the breakfast and dinner tables for large sector of population, and consumed by all income groups. The average per capita consumption was found to be 2.25 kg/month in the urban area. Faba bean production is concentrated in the North of Sudan; production takes place under farming system of small private pump schemes and some larger public schemes. It is considered among the most important annually produced crops with respect to its share in area and farm income in the River Nile State (Siddig *et al.*, 2007).

Faba bean in central Darfur state, in general, is faced by low crop productivity, lack of improved seeds, pests and diseases, marketing problems, lack of extension and credit services and climate change consequences. To alleviate the problem, improved varieties accompanied with technical packages were introduced in the study area for enhancing crop productivity and improving farmers' livelihoods security.

Productivity is commonly defined as a ratio between the output volume and the volume of inputs. In other words, it measures how efficiently production inputs, such as labour and capital, are being used in an economy to produce a given level of output (Krugman, 1994).

Dewett and Singh (1966) suggested, that the concept of productivity is based not only on the single relationship between output and input, but rather on the differences between two or more relationships i.e., differences in the same agricultural region or sub-region as between successive periods (in time), and between similar agricultural regions in different countries or regions during the same period (in space). It may also be possible to make comparisons between the trends of productivity for different products, between different regions of the national economy or between the agricultural regions and the national economy as a whole.

Partial budgeting is a management tool that can compare the costs and returns that are affected by a potential change in a business. It is especially useful in evaluating budgets that involve small, specific, and limited changes within a business by helping to determine the profitability of that change (Breima and Khalifa, 2016).

The overall objective of the study is to know the economic performance of improved seeds in the study area. More specifically the study concentrated on: Assessing the yield performance of faba beans against local check. Furthermore, study aims to know the extent of which improved faba bean can be introduced as leguminous and notorious crops in the study area.

Research Methodology

Zalingei locality lies between Latitudes 14 – 12⁰ N and longitudes 23 – 22⁰ E. Research on faba bean was carried out in association with faba bean breeding section at Hudeiba research station. Two improved Faba Beans (Shendi & Basabeer) were planted against one local check (Super bolded seed). Seeds were planted on one side of ridge 70 cm wide at plant spacing of 20 cm with two seeds per hole. The gross plot area for each genotype was 4200 m². 100 kilogram of urea was applied into two doses. Clustered Random sampling technique was used to collect farmer production and costing information. Both productivity coefficient and partial crop budget were endorsed in analysis and evaluation.

The formula for assessing productivity coefficient would be read according to Krugman (1994) as:

$$\frac{Y}{Y_n} : \frac{T}{T_n}$$

Where:

Y = Total yield of respective crop in the unit area

Y_n = total yield of the crop at the national level

T = Total crop area of unit

T_n = Total crop area at the national level

Results and Discussion

Crop Productivity

The productivity of faba bean was found to be 2.5, 2.2 and 1.7 ton per hectare for Shendi, Basabeer and local Super, respectively. Results also revealed that improved genotypes exceed local super by 47% and 29% (Table 1). This results highlight that improved faba bean has good potential to be used as cash and food crop in the study area. These results agreed with what had been claimed by Abusarra (1996).

Results of partial crop budget was presented in Table (2). Yield from on farm experiment was adjusted downwards by 20% to reflect the difference between the experimental yield and the yield that farmers expected from the same treatment. The highest net returns were obtained by improved Shendi (SDG 43,335) followed by Basabeer (SDG 34,950) while the lowest net returns recorded by local super with SDG 30,362. In contrast the highest SDG cost was given by improved Basabeer (17,070) and the lowest realized by local super (SDG 16,328). Study indicated that the net return of local super was lower than that of improved genotype by 43 and 15% for Shendi and Basabeer, respectively. Result also showed that the cost-benefit ratio is varied from 1.9 to 2.1 to 2.6. This give evidence that faba bean is financially profitable and acceptable to be grown in the area of the study. This result was in line with Chanza, and Hoffmann (2016) in the concept that farmers usually gain benefit from the use of improved legume technologies.

Conclusion

The study concluded that there was increase in faba bean productivity and this attributed to improved genotypes. The overall performance of improved faba bean is financially worthy and indicating their profitability in the study area. Minimizing the production costs and maximizing the economic yield, as study recommended, could be achieved by conducting research needed in crop water requirement and pests and diseases control.

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Table (1): Faba bean yield performance of improved genotypes compared to local Check in Zalingi locality (2017/18)

Entry	Area (m ²)	Yield (kg)	Yield (ton/ha)	Yield increase %
improved Shendi	4200	1050	2.5	47
improved Basabeer	4200	910	2.2	29
local (Super bolded)	4200	700	1.7	-

Source: Author, 2017

Table (2): Partial crop budget for improved genotypes compared to local Check of faba bean of in Zalingi locality (2017/18)

operation costs	SDG/ha		
	Shendi	Basabeer	local Super
1. Costs			
land preparation	2857	2857	2381
Planting	1190	1310	852
Seeds	2380	2380	2857
seed dressing	238	238	238
Weeding	2619	2619	2619
pest control	476	952	476
Fertilization	1905	1905	1905
Irrigation	3571	3571	3571
Harvesting	1429	1238	1429
Total variable costs	16,665	17,070	16,328
2. Returns			
yield (kg/ha)	2500	2167	1667
Adjusted yield (kg/ha)	2000	1734	1334
price (SDG/kg)	30	30	35
gross field benefits	60,000	52,020	46,690
Net returns (2 - 1)	43,335	34,950	30,362
cost benefit ratio	2.6	2.1	1.9

Source: Author, 2017

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