Sesame: the Underexploited Organic Oilseed Crop

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Sesame (*Sesamum indicum* L.) is an important oilseed crop that ranks sixth among vegetable oils worldwide. Asia and Africa respectively account for 2.55 and 0.95 of the 3.66 million tons produced worldwide. However, Africa's net export of the commodity is just 38% of its production, despite the fact that the Continent has favourable weather conditions that would support large-scale growing of the crop for commercial purposes. Presently, majority of the primary growers of the crop on the continent produce non-certified organic Sesame but which meets the specific requirements for organic Sesame. Recently released varieties of the crop, i.e. NCRIBEN-01M, NCRIBEN-02M, NCRIBEN-03L and Ex-Sudan (exotic variety) readily meet the premium quality requirements for export (i.e. 1000 seed weight>3.0 g, 40-50% oil content and pearly-white seed colour). This paper presents data on the agronomic performance of these varieties.

Key words: Sesame; Oil content; Seed export

Introduction

Sesame (*Sesamum indicum* L.) is one of the world's oldest spice and oilseed crops. It is mainly grown for its seeds, which contain approximately 50% oil and 25% protein (Burden, 2005). The presence of some antioxidants (sesamum, sesamolin and sesamol) makes the oil one of the most stable vegetable oils in the world. The world production of Sesame is estimated at 3.66 million tonnes, with Asia and Africa producing 2.55 and 0.95 million tons, respectively (Anon, 2008). The crop requires only 500-650 mm of rainfall per annum and Africa is naturally endowed with weather conditions that support its production. Unfortunately, the average world yield of Sesame is still low, estimated at 0.46 ton ha^{-1} (FAO, 2004). This had been attributed to the cultivation of low yielding dehiscent varieties with low harvest index values; yield loss during threshing; and lack of agricultural inputs, such as improved varieties, fertilizers and agro-chemicals (Ashri, 1994, 1998; Weiss, 2000; Uzun & Cagirgam, 2006). However, non-dehiscent Sesame varieties, with a yield potential of over 1 ton ha^{-1}, that are suitable for mechanical combine harvest have been developed by SESACO (SESACO, 2007).

The organic Sesame market has been recognized as rapidly growing worldwide, with an annual growth rate of 50% (EPOPA, 2005). With the exception of Uganda, which exports organic Sesame, however, most Sesame farmers in Africa produce conventional Sesame for subsistence, often without using agro-chemicals—a practice that has been described as "organic by default" or "non-certified organic agriculture" (Alteri, 2002). Therefore, the development of high yielding varieties that can produce very well in a wide range of agro-ecozones is one of the veritable tools that could be used to boost the production of Sesame by farmers in the tropics. In this study, therefore, three newly developed varieties

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(i.e. NCRIBEN-01M, NCRIBEN-02M and NCRIBEN-03L), released to farmers in 2002, and Ex-Sudan, an exotic variety from Sudan, were evaluated for their yield performance and export potential.

World Sesame Production and Trade

Data on Sesame production and trade across the world's regions are presented in Table 1.

Table 1: Regional Sesame Production and Trade

Region	Area harvested ml ha	Production (tons)	Imports (tons)	Exports (tons)
Asia	4.48	2,547	6901	342
Africa	2.80	953	60	422
South America	0.14	79	4	54
Central America	0.13	81	32	37
North America	0	0	54	3
Europe	0.40	2	146	25
Oceania	0	0	8	0
World	7.95	3662	7205	883

Source: FAO (2005)

Asia and Africa respectively produce 70 and 26% of the world's Sesame. About 24% of the Sesame produced in the world is exported from the regions where it is produced while, in Africa, 44% of the produce is exported. In 2001, Nigeria became Japan's largest supplier of Sesame (Chemonics, 2002). Asia imports over twice as much Sesame as it produces, because the seeds are consumed as *tahini* or crushed into toasted oil. Thus, it is recommended that Africa steps up her production, to benefit from the ever-increasing demand for the crop, especially in Asia. Table 2 shows the top sixteen (16) Sesame producing countries in the world.

Table 2: Major Sesame Producing Countries in the World

s/n	Country	Area Harvested (ha)	Production (tons)
1	China	660	800
2	India	1850	750
3	Myanmar	1370	606
4	Sudan	1700	331
5	Uganda	210.8	121
6	Nigeria	165.1	83
7	Pakistan	135.2	75
8	Ethiopia	93.1	72
9	Bangladesh	80.1	55
10	Central African Republic	42.1	47
11	Thailand	63.9	46
12	Tanzania	104.8	45
13	Egypt	29.9	41
14	Guatemala	55.8	39
15	Chad	95.1	39
16	Paraguay	67.9	37

Source: FAO (2005)

Table 2 shows that most (8) of the leading Sesame producing countries are from Africa, followed by Asia (6) and Latin America (2). Together, these countries contribute 84% of the world's Sesame production. It may be noted, from Table 2, that much of this production is in semi-arid regions, where rainfall is relatively low, which confirms Sesame as a drought-tolerant crop that is cultivatable in many areas including those in which most grain crops cannot survive. Exporting about 209 tons, Sudan was the world's leading exporter, followed by India (173 tons) while China was the leading importer (153 tons). Over the last decade, the market for Sesame in Asia and Europe has been growing at a very high rate, because the products from Sesame meet the health requirements for food in the developed world and the popular cuisine in the oriental world.

Under Exploitation of Sesame

Sesame is underexploited, despite the fact that most tropical farmers grow it organically by default and that its seeds are demanded by a variety of markets in various forms (e.g. raw seeds, crushed unrefined oil and refined oil). Accordingly, efforts should be geared at producing products that meet the specifications of international end-users/markets. Efforts should also be directed towards overcoming poor pricing, due to producers' ignorance of the quality issues that can attract premium prices in the world market. This is especially on the understanding that Sesame commands a relative advantage, since yields under mechanization and traditional systems are comparable, meaning that local producers might remain relevant as world demand increases.

Evaluation of some Improved Varieties of Sesame

During the late growing seasons of 2004, 2005 and 2006, three (3) newly released varieties of Sesame (i.e. NCRIBEN-01M, NCRIBEN-O2M and NCRIBEN-03L) and Ex-Sudan (an exotic variety from Sudan) were evaluated for seed yield, yield attributes and oil content relative to earlier varieties (i.e. E-8, PBTil and Yandev 55). This was done using field experiments in a forest-savannah transition zone of Nigeria. Data on the varieties' premium export characteristics and seed yield in 2006 are presented in Table 3. Data is presented for 2006 alone because this is the year Ex-Sudan and Yandev 55 were introduced.

Table 3: Agronomic Traits of some Improved Varieties of Sesame

Variety	1000 seed weight (g)	Oil content (%)	Seed yield (t/ha)
E-8	3.4	50	0.77
PBTil	3.0	45	1.05
NCRIBEN-01M	3.3	45	0.85
NCRIBEN-02M	3.0	45	0.92
NCRIBEN-03L	2.6	40	1.23
Yandev 55	2.5	40	1.11
Ex-Sudan	3.0	50	1.21
Lsd (0.05)	0.22	2.88	ns*

*not significant

Table 3 shows that only E-8, NCRIBEN-01M, NCRIBEN-02M and Ex-Sudan recorded 1000seed weight equal to, or above, 3.0g. E-8 and Ex-Sudan contained significantly higher oil than the recently released varieties. Although NCRIBEN-03L (late maturing variety) produced (comparatively) high yields, its seeds were rather small (2.6g), with relatively low oil content. As such they are not likely to attract premium prices. It is noteworthy that all the varieties had a pearly white colour, which meets the colour requirement for Sesame exports. Therefore, NCRIBEN-01M, NVRIBEN-02M and Ex-Sudan are recommended for large scale production, since they meet the premium requirement for Sesame exports.

These results confirm earlier conclusions that Sesame has much potential for large scale and profitable production in the forest-savannah transition zone (Olowe et al., 2003; Olowe, 2004, 2007).

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