Rapid Communication

APPROPRIATE THRESHING PROCEDURE GUARANTEES ENHANCED GRAIN YIELD OF DEHISCENT SESAME (*SESAMUM INDICUM* L.)

OLOWE V.I.O.[1], ADENIREGUN O.O.[2]

[1]*Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR), University of Agriculture, Abeokuta, Ogun State, Nigeria*
[2]*Department of Plant Physiology and Crop Production, University of Agriculture, Abeokuta, Ogun State, Nigeria*

Abstract

Five post harvest threshing procedures were assessed for sesame var. E8 as follows: T1 – Control plants threshed once at one week after harvest (WAH), T2 – plants threshed twice at 1 and 2 WAH, T3 – plants threshed twice at 2 and 3 WAH, T4 – plants threshed twice at 3 and 4WAH and T5 – plants threshed twice at 4 and 5 WAH to determine its grain yield in the transition zone of southwest Nigeria. The treatments were laid out in randomized complete block design and replicated three times. All sesame plants were harvested at physiological maturity (PM). Sesame plants threshed twice at 3 and 4 WAH and at 4–5 WAH recorded the highest grain yield (861 kg/ha) and 1000 seed weight (3.6 g), respectively. These values were significantly higher than the other treatments with the control producing the lowest yield of 261 kg/ha and T2 the lowest 1000 seed weight (2.7 g). The results indicated that the capsules of sesame plants harvested at PM should be adequately dry to release the seeds when threshed twice at 3 and 4 WAH.

Key words: intervals, threshing, grain yield, 1000 seed weight, physiological maturity, sesame, *Sesamum indicum* L.

INTRODUCTION

In the last four decades the status of sesame (*Sesamum indicum* L.) has been improving significantly world wide. Between 1960 and 2000, area under sesame cultivation increased by 149% and its production by 207% due to significantly rising demand for sesame imports which increased by 550% (FAO, 2000). Unfortunately, seed loss of up to 50% at harvest and during post harvest handling still remains the major problem for sesame producers (Weiss, 2000). At present over 99% of the sesame in the world is harvested manually since the capsules shatter as they dry down and the common varieties grown are of the dehiscent types (Weiss, 2000; Langham et al., 2006 and 2007), unlike the non-dehiscent sesame varieties developed by SESACO (Sesame Coordinators) in USA with yield potential of over 1000 kg/ha and suitable for direct combine harvest (SESACO, 2007).

Most of the farmers in the tropics fail to harvest sesame at physiological maturity (PM) stage but rather cut mature plants with open capsules using sickle, bundle and shock to dry in the field or move to a shock fence or threshing floor for further processing as the plants dry and in the process loose substantial amount of seeds. The farmers believe that it is premature to harvest the plant at this stage since some of the upper leaves are still green. Consequently, average world yield still remains as low as 397 kg/ha (FAO, 2000). In order to resolve this dilemma and thereby proffer solution, our study was conceived to determine the grain yield and 1000 seed weight of sesame harvested at physiological maturity as influenced by time and intervals of threshing.

MATERIALS AND METHODS

The field trial was conducted during the late rainy season (June-November) of 2006 at the Teaching and Research Farm of the University of Agriculture, Abeokuta (7° 15´ N, 3° 25´ E, 140 m above sea level) in the forest-savanna transition zone of southwest of Nigeria. The soil of the experimental site was sandy loam with a pH of 5.9. The test variety was E8 an improved early maturing sesame variety with white seeds, 50% oil content and 1000 kg/ha potential yield (Idowu, 2002).

The experiment was laid out in randomized complete block design with three replications. All the sesame plants were harvested at physiological maturity (when

about 90% of the capsules had turned yellow and the lower leaves already senescing) using a sharp knife (sickle) to cut the stem a little above the soil level. The harvesting method adopted was Fence B as described by van Rheneen (1967). The fence was 1.5 m high with two horizontal poles at 1.5 m and 0.6 m above the ground, respectively. The cut plants were arranged in bundles and then shocked against the fence to dry. The harvested plants arranged in bundles were subjected to the following treatments: T1 – Control plants threshed once at one week after harvest (WAH), T2 – plants threshed twice at 1 and 2 WAH, T3 – plants threshed twice at 2 and 3 AH, T4 – plants threshed twice at 3 and 4WAH and T5 – plants threshed twice at 4 and 5 WAH. Polythene sheets were spread underneath the bundles to collect seeds that fell out of shattered capsules. All the seeds collected from each experimental unit were added together.

Data collected on grain yield and 1000 seed weight were subjected to analysis of variance using MSTATC software package programme (Freed et al., 1989). Group means were compared with orthogonal contrasts; i.e., (i) T1 versus others (T2, T3, T4 & T5), (ii) T1 vs (T2 & T3), (iii) T1 vs T2, T3 & T4) and (iv) T1 vs (T3, T4 & T5) for the two measured characters. The treatment means were separated using least significant difference method as described by Steel and Torrie (1980).

RESULTS AND DISCUSSION

Grain yields and 1000 seed weight recorded for the different treatments are presented in Table 1. Sesame plants harvested at physiological maturity and shocked on the fence to dry for one week before being threshed once (control) recorded significantly lower yield than plants harvested, shocked and threshed twice between 2 and 5 WAH. Plants threshed twice at 4 and 5 WAH produced the highest grain yield of 861.3 kg/ha which is much higher than the world average of 397 kg/ha (FAO, 2000) and lower than the variety's potential yield of 1000 kg per ha (Idowu, 2002). The appreciably low grain yields obtained when threshed at I WAH and twice at 1 & 2 WAH could be attributed to insufficiently dry capsules and hence incomplete release of the seeds after threshing since sesame seeds take most commonly 35–45 days after flowering (DAF) to attain maximum dry weight (mass maturity) (Sheelavantar et al., 1978; Narayanan et al., 1990; Day, 2000). In our study, sesame var. E8 flowered at about 45 days after planting (DAP) and was harvested at physiological maturity (84DAP) indicating that it still required at least a week more to attain mass maturity. The highest grain yield recorded after threshing at 3 and 4 WAH suggests that the capsules were adequately mature and dry, and readily released the seeds during threshing. The significantly lower yield recorded after delaying threshing till 4 and 5 WAH (T5) was probably due to pest attack (ants and birds) on the seeds that fell on the polythene sheets spread under the shocked plants sequel to prolonged stay on the fence. Van Rheneen (1967) collected shattered seeds daily, used insecticides, baits and human guards against the ants, mice and birds, respectively. However, these measures were not taken in our study in order to reduce the cost of production.

One thousand seed weight is one of the key traits considered in grading premium sesame and it should normally be greater than 3 g (Bennett et al., 1998). It is also used to characterize sesame varieties and a range of 2.43–3.2 g had been reported for fourteen entries evaluated in the forest savanna transition zone (Olowe,

Table 1: Grain yield and 1000 seed weight of sesame var. E8 subjected to different post harvest procedure

Treatment	Description	Grain yield 1000 seed	
		(kg/ha)	weight (g)
T1 (Control)	Plants threshed once at one week after harvest (WAH)	261.0	2.8
T2	Plants threshed twice at 1 and 2 WAH	311.0	2.7
T3	Plants threshed twice at 2 and 3 WAH	499.7	3.1
T4	Plants threshed twice at 3 and 4 WAH	861.3	3.3
T5	Plants threshed twice at 4 and 5 WAH	511.0	3.6
LSD (0.05)		181.42	0.14
Orthogonal contrasts			
T1 vs (T2,T3 T4&T5)		**	**
T1 vs (T2 & T3)		ns	ns
T1 vs (T2,T3 & T4)		**	**
T1 vs (T3,T4 &T5)		**	**

** significantly different at $p \leq 0.05$. NS = not significant

2004). In this study, 1000 seed weight increased linearly as threshing was delayed from 1 to 5 WAH attaining the maximum weight of 3.6 g at 4&5 WAH. The 1000 seed weight of seeds obtained from sesame threshed at 1 and 2 WAH was less than 3 g because the seeds were yet to attain mass maturity (Day, 2000). With regard to grain yield and 1000 seed weight, there were highly significant ($P \leq 0.01$) differences between the control (T1) and groups of T2–T5, except T2 & T3 contrasts (Table 1). This suggests that harvesting sesame plants at PM and shocking on the fence before threshing twice at 2–3 WAH might not be appropriate for sesame.

CONCLUSION

Sesame should be harvested at physiological maturity and shocked on a fence, and threshed twice from 3 to 5WAH in order to obtain optimum grain yield and seed weight.

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Cooresponding author:

Prof. Victor I.O. Olowe
Institute of Food Security
Environmental Resources and Agricultural Research
University of Agriculture
P.M.B. 2240, Abeokuta
Ogun State, Nigeria
e-mail: owebaba@yahoo.com