INFLUENCE OF SUNFLOWERSEED GRADING ON GERMINATION AND VIGOUR

Jocely Andreuccetti Maeda, Scientific Researcher, Dr., Centre of Propagative Material Production , IAC. Caixa Postal. 28. 13001-970 Campinas, SP, Brazil.
Fax: 55 19 2423602 ; e-mail:jamaeda@cec.iac.br
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Maria Regina Gonçalves Ungaro,. Scientific Researcher, Dr., CEGRAN, IAC.
Caixa Postal. 28. 13001-970 Campinas, SP, Brazil.
Fax: 55 11 4343483 ; e-mail:ungaro@cec.iac.br
With research grants of Research National Council, CNPq

SUMMARY

The influence of screen size on seed physiological quality was evaluated in the open-pollinated variety IAC-Anhandy. The seeds were graded into nine fractions using screens varying between 10/64 in. and 18/64 in. After the initial evaluation through germination and vigour tests, the seeds were stored under ambient conditions. The lots were re-evaluated after four, eight and twelve months of storage. The results showed that the number of dead seeds increased between the small seeds under storage. In the first evaluation there was a tendency for abnormal seedlings to occur in the larger seeds.

Key-words: storage, seed vigour, dormancy, germination, seed size, sunflower.

INTRODUCTION

Seed size classification is necessary for good adjustment of ***disk sowing machine,*** in order to obtain the best SEED distribution in the field.

Some papers discuss seed physiological quality in relation to seed grading. Marcos Filho et al. (1986a, b, c) relate that seed germination and vigour show a tendency to be lower when seed width is inferior in more than 0.8 mm of the lot average, although these fractions represent only 10% of the original lot weight. They also found that seed size influences mainly the emergence and initial development of the plants.

Tewari (1978) and Ramaiah et al. (1996) also found that vigour is directly related to seed size, although Aguirrezabal et al. (1985) did not find difference between seed size and emergence, yield and harvest index, which agree with Adamo et al. (1984).

The objective of the present research was to evaluate the possible influence of screen size on seed physiological quality of cv. IAC-Anhandy.

MATERIAL AND METHODS

Physiological sunflowerseed quality of the open pollinated variety IAC-Anhandy was evaluated just after harvest and after storage. The seeds were size graded into nine fractions varying from 10/64 to 18/64 in. A control lot was separated without classification. In each fraction the germination level and vigour were evaluated through the percentage of normal and abnormal seedlings, dormant and dead seeds, and germination speed.

The evaluations were done under alternate temperature of 20^{o}C during 16 hours followed by 8 hours at 30^{o}C. Paper roll substrate was used for seed germination, with eight replications of 50 seeds each. The number of germinated seeds were counted daily, during 14 days, in order to calculate the vigour index.

After the initial evaluation, the seeds were stored under laboratory conditions; the tests were replicated after four, eight and twelve months of storage.

RESULTS AND DISCUSSION

Table 1 and Figure 1 show the initial dormancy level for all seeds lot, with the average of 8.6%. in the control. The percentage of normal seedlings was 81% in the control, reaching the lowest values for screen 17. Seeds from screen 18 show the least dormancy level. The percentage of normal seedlings in the first evaluation was 81% in the original lot and 74% in the screen 17, which also showed the least germination speed and higher number of abnormal seedlings, together with screen 18. The viability was high in all screens as the highest percentage of dead seeds was 6%.

Soon after harvest, the smaller achenes presented a delayed emergence. After twelve months of storage, there was no statistical difference between the lots, but the number of dead seeds increased from 3.6 and 3.0 to 14.7 and 15.0 for screens 10 and 11, respectively (Table 1, Figure 1 and 4).

After four months of storage (Table 1; Figure 1b) the data for dead seeds and germination speed presented no difference between the seed lots; the dormancy release was completed and the viability was high.. There was a slightly decrease in the abnormal seedlings, except for screens 13 and 14, and an increase in the normal seedlings. The germination speed was fairly decreasing with the increasing of seed size. Again screen 18 showed greater amount of abnormal seedlings (8,1%).

It is easily seem that after eight months of storage (Figure 2a) the smaller seeds (screen 10) presented the least germination speed, besides the greater number of abnormal seedlings and deterioration rate shown by the higher number of dead seeds and lower germination speed.

After twelve months of storage original lot presented 84% of normal seedlings; screens 10 and 11 showed higher percentage of dead seeds and abnormal seedlings (Table 1, Figure 2b). At this time, the germination speed was quite the same for all treatments and far below from previous evaluations, pointing out the generalized lost of vigour from the seeds.

Table 1 – Evaluation results of sunflowerseed grading lots. Average of 8 replications.

	Germination test				Vigour test
Evaluations	Normal Seedlings	Abnormal Seedlings	Dead Seeds	Dormant Seeds	Germination speed
	(%)	(%)	(%)	(%)	(rate)
0 Months					
Original lot	81.1ab	4.6ab	4.8a	8.6ab	52.7ab
Screen 10	86.2a	2.1b	3.6a	5.8b	49.9ab
Screen 11	84.3ab	4.1ab	3.0a	8.0ab	52.7ab
Screen 12	81.3ab	3.6b	5.0a	9.4ab	52.5ab
Screen 13	86.1a	1.5b	5.2a	6.8ab	50.3ab
Screen 14	83.0ab	3.6b	3.5a	9.1ab	53.6ab
Screen 15	78.4ab	4.9ab	4.0a	11.5a	50.1ab
Screen 16	82.8ab	5.2ab	4.1a	7.2ab	47.8abc
Screen 17	74.3b	9.7a	6.0a	8.3ab	43.4c
Screen 18	79.9ab	9.9a	3.5a	4.9b	46.6bc
4 Months					
Original lot	89.9ab	2.9ab	6.6a	0	44.0a
Screen 10	94.7a	2.0b	1.8a	0	47.3a
Screen 11	91.9ab	2.3b	4.4a	0	46.9a
Screen 12	92.2ab	3.0ab	3.7a	0	47.1a
Screen 13	90.0ab	5.2ab	2.7a	0	45.7a
Screen 14	90.0ab	4.9ab	4.2a	0	45.7a
Screen 15	92.3ab	3.6ab	3.5a	0	44.8a
Screen 16	90.8ab	3.9ab	3.3a	0	43.0a
Screen 17	88.3ab	6.2ab	4.4a	0	42.9a
Screen 18	87.5b	8.1a	3.5a	0	41.9a
8 Months					
Original lot	91.3abc	0.3bc	7.6a	0	62.0a
Screen 10	83.6c	4.5a	11.6a	0	50.7c
Screen 11	86.5bc	4.3a	9.1a	0	54.9bc
Screen 12	90.7abc	2.1ab	6.8a	0	60.6ab
Screen 13	90.3abc	1.2abc	6.6a	0	59.1ab
Screen 14	93.0ab	1.6ab	4.6a	0	60.4ab
Screen 15	93.0ab	0.5bc	6.0a	0	58.5ab
Screen 16	93.8[a]	0.0c	6.1a	0	55.9abc
Screen 17	92.8ab	1.0abc	4.8a	0	57.5ab
Screen 18	91.6abc	1.9ab	6.1a	0	59.7ab
12 Months					
Original lot	83.7abc	7.6a	7.1ab	0	24.5a
Screen 10	75.8c	9.2a	14.7a	0	21.5a
Screen 11	77.1bc	7.3a	15.1a	0	21.4a
Screen 12	82.9abc	6.8a	10.0ab	0	25.1a
Screen 13	87.8[a]	5.0a	6.9ab	0	24.5a
Screen 14	82.3abc	7.3a	9.8ab	0	22.3a
Screen 15	86.4ab	5.6a	7.8ab	0	23.8a
Screen 16	86.4ab	6.8a	6.6ab	0	24.2a
Screen 17	88.2[a]	5.8a	5.6b	0	23.9a
Screen 18	88.8[a]	3.5a	5.8b	0	23.3a

Figure 1- Germination speed index and percentage of normal seedlings, abnormal seedlings, dormant and dead seeds in the germination test of sunflower achenes classified by size through different screens. Evaluations done soon after harvest (Fig.1a) and after four months (Fig.1b) of storage at room temperature.

Fig. 1a

Fig. 1b

Figure 2- Germination speed index and percentage of normal seedlings, abnormal seedlings, dormant and dead seeds in the germination test of sunflower achenes classified by size through different screens. Evaluations done after eight (Fig.2[a]) and twelve months(Fig.2b) of storage at room temperature.

Fig. 2a

Fig. 2b

CONCLUSIONS

- For cv. IAC-Anhandy, there is a tendency of larger seeds to originate more abnormal seedlings, soon after harvest;
- Soon after harvest, small seeds presents higher germination level; as storage goes up, the germination level decreases in the smaller seeds and increases in the larger ones. The same pattern is found for dead seeds.
- Seed ageing causes an increase of dead seeds specially for smaller seeds

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