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Detection of Mechanical Damaged Seeds in Soybean Using Color Reaction of Safranin Solution

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ABSTRACT

The present study was carried out with an aim to investigate the proper staining concentration and time of safranin solution to measure the mechanical damage in seeds of soybean crop. Two types of seed material were used i.e. processed and raw. Safranin chemical was used to measure the mechanical damage in both type of seed material with various concentrations i.e. Concentrate, 10%, 25% and 50%. The observations of the study indicate that for color reaction of 10% safranin solution for 10 minute was found most suitable to differentiate the damage and intact seeds.

Key words: *Soybean, Machenical Damagea, Sfranin.*

INTRODUCTION

Soybean [*Glycine max* (L.) Merill] is an important legume crop. The soybean is a number one in world oil production and is a cheap source of protein for food and feed. The constraints in soybean production are becoming increasingly evident especially those associated with seed quality problems, which is dependent on the manner in which seeds are handled during harvesting, processing and storage. Two main factors appear to contribute to the low storability of soybean seed. Besides inherent poor storability, mechanical damage is one more factor strongly responsible for seed quality deterioration especially by small farmers in developing countries which has been overshadowed by more important problems such as storage deterioration, insect infestation and diseases. Mechanical damage is major cause of soybean seed deterioration during storage. Mechanically damaged or broken seed coats permit early entry and easy access for microflora to enter the seed. Both the fungi and chemical damage reduce the keeping quality of stored seeds[4].

Mechanical damage incurred during harvest and handling can lower the value of soybeans by increasing susceptibility to further mechanical damage and by speeding deterioration due to enzymatic and fungal activity during storage[3]. A method is needed to quantify the mechanical damage state of soybeans so that effects of damage on deterioration during storage can be determined. With this aim the present study was carried out to differentiate and identify the intact and mechanical damaged seeds by using safranin solution color reaction.

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MATERIALS AND METHODS

The present study was examined with the locally available seeds of soybean crop. Two types of seed material were used i.e. processed and raw. Safranin chemical was used to measure the mechanical damage in both type of seed material with various concentrations as given below to stain the seeds:

1. Concentrate
2. 10%
3. 25%
4. 50%

Seeds were stained for 5 and 10 minutes in each concentration and 3 to 5 ml of safranin solution was sufficient to stain the seeds. Three replications of each concentration and timings has 100 numbers of seeds, after staining the observations were reported as number of fully damage seed, partially damaged seeds and intact seeds.

RESULTS AND DISCUSSION

The present study was carried out with an aim to investigate the proper staining concentration and time of safranin solution to measure the mechanical damage in seeds of soybean crop. The objective of the study was to differentiate the fully damage, partially damage and intact seeds from the processed and unprocessed (raw) seed material according to color reaction.

The observations of the study indicate (Table - 1) that for color reaction of 10% safranin solution for 10 minute was found most suitable to differentiate the damage and intact seeds. The following staining observations were reported based on the color and seed shape:

1. Seeds which take dark red color and swelled may identified as fully damaged seeds.
2. Seeds which take light red color and very little swelling and wrinkles may identified as partially damaged seeds and
3. Seeds which takes no color or light pink color and no swelling may identified as intact seeds

Table 1: Mechanical damage measurement in seeds of soybean crop using safranin solution

S. N.	Safranin solution concentration %	Observation (%)					
		Intact seeds		Partially damage seeds		Fully damaged seeds	
		5 min.	10 min.	5 min.	10 min.	5 min.	10 min.
Processed Seed Material							
1	Concentrate	80±1.5	77±2.0	0±0.0	02±0.9	20±1.0	21±1.2
2	10 %	75±1.0	72±1.2	03±0.8	06±0.8	22±1.2	22±0.9
3	25 %	83±1.2	80±1.5	03±0.8	05±0.9	14±0.9	15±1.5
4	50 %	74±1.5	72±1.3	06±0.7	05±0.7	20±1.0	23±1.3
Raw Seed Material							
1	Concentrate	61±1.7	63±1.5	11±1.2	8±0.8	28±1.3	29±0.9
2	10 %	67±1.3	62±1.7	14±1.3	11±1.0	19±1.6	27±1.0
3	25 %	78±1.8	81±1.6	12±0.9	10±0.9	10±0.7	09±1.2
4	50 %	84±1.9	67±1.5	04±0.8	07±1.3	12±1.3	26±1.5

The review on the present study is not available as much, although several other chemicals like NaOH and Treatazolium were used in several studies. Preliminary tests with tetrazolium showed that this method was not consistent in indicating seed coat cracks. Furthermore, it required several hours of presoaking and soaking. This testing method was eliminated from further consideration[3]. Safranin is used as counter stain in Gram staining procedure to differentiate between gram positive and gram negative organisms. The Gram stain is a differential staining technique most widely applied in all microbiology disciplines laboratories[1]. It is one of the most important criteria in any identification scheme for all types of bacterial isolates[2]. From the present study it may be

concluded that safranin may use to detect the mechanical damage of soybean seeds with in very short duration of time.

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