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تأثير مضاد للفطريات واستخدامه للتخزين قمح ناعم عن طريق طلاء الحبوب. **ANTIFUNGAL EFFECT AND USING FOR STORAGE SOFT WHEAT BY COATING GRAIN.**

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Abstract

Keywords

Salsola vermiculata.
Asphodelus tenuifolius.
Storage by coating.
Powder.
Soft wheat.

During storage and under poor storage conditions, wheat grains may undergo various alterations caused by fungal development. Mold can produce toxins (KONONENKO, et al. 2015). that can impact the health of the consumer (Andreia, et al. 2015). It can be said that cereals are undoubtedly the most exposed to fungal contamination.

In the present study, two plant used to Analysis, evaluation and test the storage efficiency of soft wheat by coating.

Phytochemical screening conducted on the Salsola vermiculata and Asphodelus tenuifolius extracts revealed the presence of the elements has known medical and physiological activities.

This aim work makes it possible to use the method of storage soft wheat by coating grains for increases the storage time and reduces the risk of alteration by mold.

INTRODUCTION

In the strategies of nations the storage of wheat is necessarily necessary against the damage of natures or wars ... and also for nutrition.

Several methods are used for grain storage: Traditional methods such as open-air storage and underground storage, and Modern methods in co-operatives and warehouses. The silos formerly built of wood are now generally made of reinforced concrete, sometimes made of metal. but these two modes present a high risk of alteration. Molds are the main cause of microbial alterations in stored grains. (Armand, et al., 1996)

Algeria is the world's third largest importer of cereals after Brazil and Egypt. In 2005/2006, imports of imported wheat reached 5.5 million tons for an invoice of 510 million US dollars (Statistics of the France Export Cereales Association, 2006).

In the context of testing the effectiveness of the wheat storage method by coating and valorization of the Saharan plants of Algeria. We are interested in studying the coating of wheat grains by powder of plants *Salsola vermiculata* and *Asphodelus tenuifolius* and the variations in rates of contamination by molds.

The genus *Salsola* is one of the best known genera of the *Chaenopodiaceae* family, and several species have been written, including *Salsola pestifer*, *Salsola vermiculata* and *Salsola oppositifolia*. *S. vermiculata* is a typical plant of salt soils.

Asphodelus tenuifolius is spasmogenic, stimulant, laxative, diuretic and crushed plant used for the treatment of ulcers; Used to make cakes of boiled curd; seeds is good for toothaches (Shahina, 1994)



Figure 1: *Salsola vermiculata* and *Asphodelus tenuifolius*

MATERIAL AND METHODS

Samples

Sampling is carried out in accordance with ISO 13690, Official Journal of the European Union, and a practical guide for the quality control of cereals; 50 samples of imported French soft wheat were then transported to the Laboratory of Plants' Resources and Food Security in Semi-arid Areas, South-West of Algeria, University of Bechar - BP 417, Bechar (08000), Algeria.

Table 1: Presentation of samples.

Number of samples	Date of harvest	orig in
11	2008	France
11	2009	
10	2010	
08	2011	
10	2012	

The aerial parts of two plants (*Salsola vermiculata* and *Asphodelus tenuifolius*) were collected wild during the flowering phase from March to June at two sites in Bechar, in the south-

western part of Algeria, at coordinate (31 ° 33'21.71"N 2 ° 26 '40.97 "W). They have been identified at the Laboratory of Plants' Resources and Food Security in Semi-arid Areas, South-West of Algeria, University of Bechar - BP 417, Bechar (08000), Algeria.

Isolation and Enumeration

The same method was used before and after the coating; 100 randomly selected wheat grains from each sample was placed in 10 sterile Petri dishes containing sterile filter paper impregnated with 5 ml of a sterile 7.5% aqueous sodium chloride solution (Mills et al., 1978).

Phytochemical screening

Phytochemical screening the plant of *Salsola vermiculata* and *Asphodelus tenuifolius* were phytochemical screened according to traditional methods according to the method of (Harborne JB – 1973 – , Bruneton J – 1993).

Coating grains by powder

These plants were cleaned with running water, dried in a well-ventilated room and then pulverized with an electric grinder to give fine powders. The test is carried out as follows; The wheat is moistened with the powder of the plants used to coat the grains with the powder of the plant. The wheat is then dried and stored in the flasks; Each bottle contains 1 kg of soft wheat.

The effectiveness of these methods is assessed by post-drying analyses and others after one year of storage with a one-year period from March 2015 to March 2016

RESULTS AND DISCUSSIONS

Phytochemical Screening

The phytochemical screening of *S. vermiculata* and *A. tenuifolius* is shown in Table 2.

Table 2: Screening of chemical constituents of different parts of two plants *Salsola vermiculata* and *Asphodelus tenuifolius*

Plants Metabolite		<i>Salsola vermiculata</i>	<i>Asphodelus tenuifolius</i>
Cyanogenic compounds		++	++
Quinone		traces	–
Anthraquinone		+++	–
alkaloids	Dragedn orff	+	+

	iodoplatinate	+	+
	Mayer	+	–
Terpenoids		+	+
Saponosides	triterpenic	++	+++
	steroidic	–	–
coumarins		+	+
flavonoids		++	++
anthocyanins		traces	–
Tanins	cathechi c	–	traces
	gallic	+	–
+: presence – : non detected			

The phytochemical results obtained show a heterogeneity of chemical groups. The presence of a particular chemical family of elaboration of explanations on the biological activity of the plants. (Lajide , et al., 1995).

Mycological Status of Samples

The proportion of mold-contaminated grain in the 2010 and 2012 harvest samples is higher than the other samples of the 2008, 2009 and 2011. According to Wicklow (1998), shows that sporulation or spore dissemination at high velocities is the common feature of fungal species of low hydrated foods.

These results are in agreement with several studies that have found similar results in corn and sorghum silage. (Reyes-Velázquez et al. 2008; Da Silva , et al., 2000).

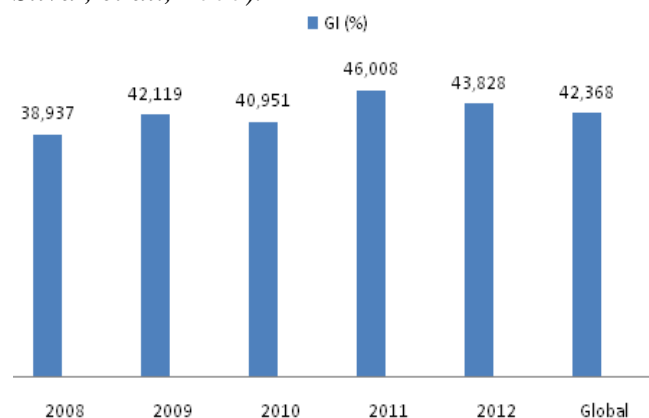


Figure 2: proportion of mold-contaminated grain

After the storage period, reductions in contamination frequencies were observed in an excellent manner in all the samples (figure 2,3,4) A reduction of the fungal flora is observed for the samples coated with the powder of the plants, and

also for the control rinsed with the water after a year of conservation. The reduction of the level of microorganisms observed in the wheat samples demonstrates the effectiveness of this conservation method. It remains to explain the coordination factors that influence the reduction of the fungal flora. Firstly, the antifungal activity of the active components of the plant. Morphological modifications of hyphae ;Direct perturbation of the fungal cell membrane and, on the other hand; The nature of active ingredients (Bergkvist,2007; Bhumika , et al 2004); Flavonoids, known for their multiple biological properties such as antifungal activity (Cushnie and Lamb, 2005,). Ousmane et al. (2016) and Qing-Hu et al. (2016) described the antifungal effects of flavonoids against cereal molds. José. et al., (2017) showed the antifungal activity of four triterpenoid and saponins of genotoxic effects. James Bound et al., (2016) showed the antifungal activities of the new Terpene phenols and alcohols against *Aspergillus flavus*, *Aspergillus ochraceus*, *Fusarium oxysporum*, *Saccharomyces cerevisiae* and *Candida albicans*.According to Huang and Chung (2003), phenolic compounds caused swelling of hyphae and inhibition of plasma permeability around hyphae. This impermeability causes the destruction of the cell walls.

The role of *Asphodelus tenuifolius* as an antibacterial agent is quite obvious and should be evaluated further as a therapeutic agent for use in the future (Dangi, 2013). The antifungal activity of the extracts of *Salsola vermiculata* remains very limited compared to the other plants studied. However, work done on the antifungal activity of some plants in southern Tunisia by Bouaziz et al. In 2009 concluded that the methanolic extract of *S.vermiculata* did not inhibit the growth of *A. niger*. While Mughal in this work in 2008 showed that the methanolic extract of *Salsola kali* showed an important activity towards *A.flavus*. However, Shahidi et al. In 2004 showed that the extracts of *Salsola kali* did not induce any activity with respect to two strains of *Candida*. The richness of this plant in saponins gives it very variable biological activities (Sparg et al., 2004; Hamed et al.,2011).

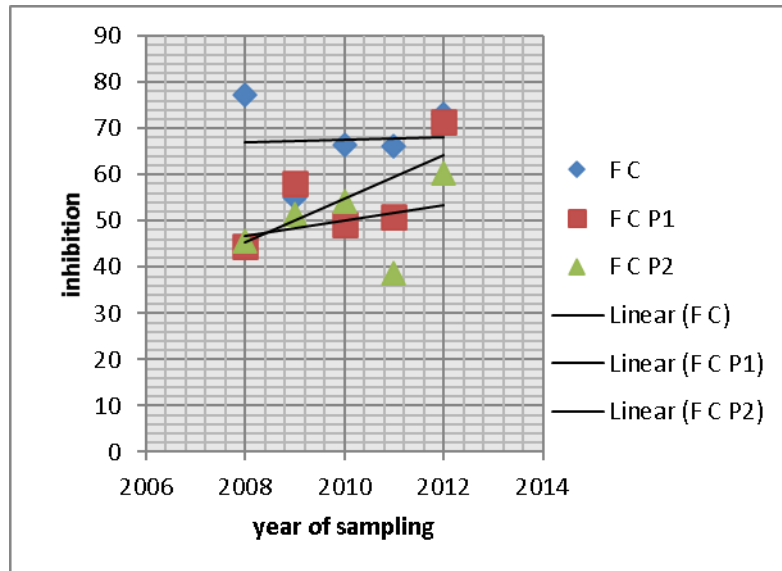


Figure 3:Results for storage of wheat and without coating by two plants and the frequency variation of contamination of molds (FC: frequency of contamination without the addition of the control extract, FCP1: frequency of contamination with Addition of *Salsola vermiculata* powder, FCP2: frequency of contamination with Addition of *Asphodelus tenuifolius* powder)

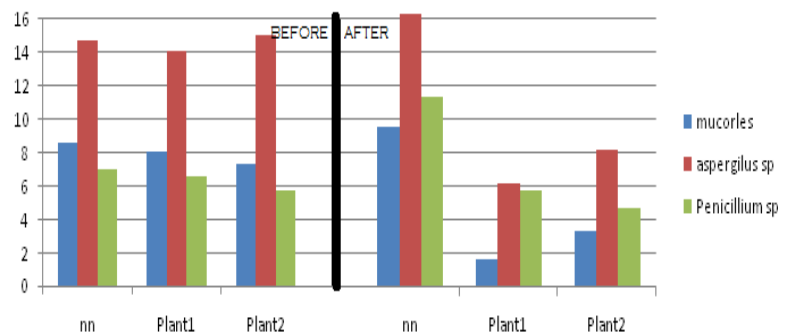


Figure 4: The results relating to the frequency of contamination of the molds studied subjected to the action of the powder of the different plants (nn: frequency of contamination without the addition of the powder, plant1: frequency of contamination with the addition of the powder of *Salsola vermiculata*, plant2: frequency of contamination with the addition of the powder of *Asphodelus tenuifolius*, before and after the storage)

CONCLUSION

The powder of the plants are tested under technique: conservation by coating. There was a decrease in the level of mold in the samples before and after the storage period, so these results

demonstrate the effectiveness of this method of preservation.

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