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Bangladesh J. Agril. Res. 36(4): 733-739, December 2011 **Short Communication**

EFFECT OF SOME INDIGENOUS PLANT EXTRACTS ON THE GERMINATION OF WHEAT SEEDS

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An experiment was conducted to determine the effect of some indigenous plant extracts on the germination of wheat seeds. Six locally available indigenous plants namely. Bazna (*Zanthoxylum rhetsa* Roxb.), Ghora-neem (*Melia sempervirens* L.), Hijal (*Bartingtonia acutangula* L.), Karanja (*Pongamia pinnata* L.), Mahogoni (*Swietenia mahagoni* L.) and -Neem (*Azadirachta indica* A. Juss.) were evaluated. Leaf and seed extracts of plants were prepared by using acetone, methanol and water as solvents. Among the treated wheat seeds. the highest germination was found in Mahogoni treated wheat seeds (95.3711V6) and the lowest in Hijal treated wheat seeds (93.88%). The extracts of all the plants did not show any adverse effect on the germination of treated wheat seeds up to 90 days of treatments.

Wheat (*Triticum aestivum* L.) is one of the first domesticated food crops and for 8,000 years has been the basic staple food in major part of Europe. West Asia, and North Africa (CIMMYT, 2009). It is one of the important cereal crops and major food grains in Bangladesh. It is stored in the government and public godowns in developed and developing countries including Bangladesh. A considerable amount of wheat as well as other grains is lost every year in storage due to biotic and abiotic factors. Stored wheat grains are subjected to the attack of many pests and diseases in storage. There are approximately 200 species of insects and mites attacking stored grains and stored products (Maniruzzaman, 1981). Gentile and Trematerra (2004) reported that 20 insect pests infested stored wheat, while Chaudhury and Mahla observed 10 insect species of wheat in storage. Among them, grain moth (Sitotroga cerealella), red flour beetle (*Tribolium castaneum*), and rice weevil (*Sitophilus oryzae*) attacked wheat seriously (Ali *et al*., 2009). Their attacks reduced both quantity and food value of stored seeds. In Banaladesh, most of the farmers are poor and marginal and store small quantities of wheat grains in their houses for consumption and seed purpose.

Different kinds of preventive and curative control measures are practiced to protect these pests. Among those, chemical pesticides have been used for a long time, but have serious drawbacks (Sharaby, 1988), such as direct toxicity to beneficial insects, fishes, and human (Pimental, I981), pesticides resistance (Brown, 1968), health hazard (Bhaduri *et al*., 1989) and increased environmental

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and social costs (Pimental *et al*., 1980). In many countries, efforts are being made to minimize the use of harmful insecticides through the use of indigenous plant products, implementation of IPM approaches, use of bio-degradable products (Khattach and Hameed, 1986) and applying insect growth regulators (Metcalf, 1975) to protect stored grains. In many areas of the world, locally available plant materials are widely used to protect stored product against damage by insect infestation (Golob and Webley, 1980). Botanical products are environmentally safe, less hazardous, economic and easily available. Botanicals like Bonkalmi (*Ipomoea maxima*), Bazna (*Zanthoxylum rhetsa*). Bishkatali (*Polygonum lanatum*), Datura (*Datura stramonium*), Durba (*Cynodon dactylon*), Eucalyptus (*Eucalyptus globulus*), Ghora-neem (*Melia sempervirens*), Hijal (*Barringtonia acutangula*), Karanja (*Pongamia pinnata*), Mahogoni (*Swietenia mahagoni*), Marigotd (*Tagetes erecta*), Neem (*Azadirachta indica*), Nishinda (*Vitex negundo*), and Pithraj (*Aphanamixis polystachya*) may be grown by farmers with minimum cost and extracted by indigenous methods.

Some indigenous plants, such as Bazna (*Zanthoxylum rhetsa*),. Ghora-neem (*Melia sempervirens*), Hijal (*Barringtonia acutangula*), Karanja (*Pongamia pinnata*), Mahogoni (*Swietenia mahagoni*), and Neem (*Azadirachta indica*) have been investigated for their compatibility in the IPM programme by determining their toxic (Mamun *et al*., 2009), repellent (Mamun *et al*., 2008a), residual and grain protectant (Mamun *et al*., 2008b) effects against red flour beetle *Tribolium castaneum* Herbst., a major stored grain pest of wheat. So, it is important to know the effect of such indigenous plant extracts on the germination of wheat seeds but a few studies have been done on this. Therefore, the present study was undertaken to determine the effect of these botanicals on the germination of wheat seeds.

The present study was conducted in the laboratory, of the Department of Entomology, Bangladesh Agricultural University (BAU), Mymensingh during the period from July 2004 to March 2005. Wheat seeds of the variety 'Sonalika' were collected from Bangladesh Agricultural Development Corporation (BADC), Mymensingh. Fresh leaves and seeds of Bazna, Ghora-'Neem, Hijal, Karanja. Mahogoni, and Neem were collected from the surroundings of BAU campus. Afterwards, they were washed in running water. The plants were kept in shade for air-drying and then they were dried in the oven at 60^0C to gain constant weight. Dusts were prepared by pulverizing the dried leaves and seeds with the help of a grinder. Then the dusts were passed through a 25-mesh diameter sieve to obtain fine and uniform dint. The dusts were preserved in airtight condition in polythene bags till their use in extract preparation. The prepared leaf and seed dusts were used for preparation of plant extracts. Each category dust (10g) was taken in a 500 ml beaker and mixed separately with 100 ml of different solvents (acetone, methanol, and distilled water). Then the mixture was stirred for 30 minutes by a magnetic stirrer (at 6000 rpm) and left to stand for next 24 hours. The mixture was then filtered through a fine cloth and again through filter paper (Whatman No. I). The filtrated materials were taken in a round bottom flask and condensed by evaporation of solvent in a water bath at 45^0C, 55^0C, and 80^0C temperature for acetone, methanol, and water extracts, respectively. Evaporation was done to make the volume 10 ml. After the evaporation of solvent, the condensed extracts were preserved in tightly corked labeled bottles and stored in a refrigerator until their use. Different concentrations of plant extracts were prepared by dissolving the stock solutions in the respective solvent prior to germination test of wheat seeds.

The germination of the treated wheat seed was evaluated by the process described by Qi and Burkholder (1981). The seeds were treated with different plant extracts at 5.0, 7.5. 10.0, and 12.5% of respective plant extracts. The treated seeds were then dried under shade and kept for 3 months in the plastic container to prevent infestation. The seeds were then taken to test their germination by using blotting paper method (Agrawal, 1980). Fifty seeds from each treatment were placed on petridishe of 9.0 cm diameter containing water soaked blotting paper. Each treatment was replicated thrice. The well germinated seeds in each petridish were counted after 7 days of treatment and expressed in percentages. The experimental data were analyzed by completely randomized design (factorial CRD) using MSTAT statistical software in a microcomputer and mean values were separated by Duncan's New Multiple Range Test (DMRT)

Table 1. Germination rate of wheat seeds treated with plant parts extracts of different plants (Interaction of plant and plant part).

Plant	Germination. (%)		
	Leaf	Seed	Average value
Bazna	95.12a	94.48bc	94.80b
Chora-neem	94.11 b-e	93 92d	94.02c
Hijal	94.03c-e	93.72e	93.88c
Karanja	95.31 a	95.23a	95.27a
Mahogoni	95.53a	95.21 a	95.37a
Neem	94.60b	94.41 b-d	94.50b
$\overline{SX}$	0.1702		0.1204
Probability level	0.05		0.011

Within column and row values followed by different letter(s) are significantly different by DMRT.

Table 2. Germination rate of wheat seeds treated with plant part extracts of different plants at different dose level (Interaction of plant part and dose).

Plant part	Germination (%)				
	Dose (%)				Average value
	5.0	7.5	10.0	12.5	
Leaf	95.04a	94.89ab	94.74a-e	94.47bc	94.78a
Seed	94.80a-c	94.75a-c	94.38cd	94.04d	94.50b
$\overline{SX}$	0.1390				0.0695
Probability level	0.05				0.01

Within column and row values followed by different letter (s) are significantly different by DMRT.

Table 3. Germination rate of wheat seeds treated with plant extracts of different solvents at different dose level (Interaction of solvent and dose).

Solvent	Germination (%)				
	Solvent				Average value
	5.0	7.5	10.0	12.5	
Acetone	94.55cd	94.56cd	94.18de	93.99e	94.32b
Methanol	94.68cd	94.69cd	94.48c-e	94.23de	94.52b
Water	95.53a	95.21ab	95.02bc	94.55cd	95.08a
$\overline{SX}$	0.1702				0.0851
Probability level	0.05				0.01

Within column and row values followed by different letter (s) are significantly different by DMRT.

Results on the effect of different plant extracts on the percent germination of wheat seeds are presented in Table 1-5. Different plant and plant part extracts had significant effect on germination of wheat seeds (Table 1). Interaction of different plant parts at different dose level had significant effect on germination of wheat seeds and the highest germination percentage was recorded in leaf extracts (Table 2). Among the solvents, the highest germination (95.08%) was found in wheat seeds treated with water extracts followed by methanol (94.52%) and acetone (94.32%) extracts (Table 3). Similarly, the highest (95.75%) germination was found in wheat seed treated with water extracts of Mahogoni and the lowest (93-57%) in acetone extracts of Hijal (Table 4). The interaction effects of different doses and different plant extracts showed that the average germination was the highest at 5.0% dose level (94.92%) and the lowest (94.26%) at 12.50% dose level. Germination of wheat seeds decreases gradually with the increase of doses (Table 5).

Table 4. Germination rate of wheat seeds treated with different plant extracts of different solvents (Interaction of plant and solvent).

Plant	Germination (%)			
	Solvent			Average value
	Acetone	Methanol	Water	
Bazna	94.10f-h	94.76c	95.53ab	94.80b
Ghora-neem	93.65gh	94.05f-h	94.35d-f	94.02c
Hijal	93.57h	93.81f-h	94.24e-g	93.88c
Karanja	95.23a-c	94.89b-e	95.70a	95.27a
Mahogoni	95.13a-c	95.23a-c	95.71a	95.37a
Neem	94.25e-g	94.35d-f	94.91b-d	94.50b
$\overline{SX}$		0.2085		0.1204
Probability level		0.01		0.01

Within column and row values followed by different letter(s) are significantly different by DMRT.

Table 5. Effect of doses of different plant extracts on germination rate of treated wheat seeds (Interaction of dose and plant).

Dose (%)	Germination (%)						
	Plant						Average value
	Bazna	Ghora-neem	Hijal	Karanja	Mahogoni	Neem	
5.0	95.07b-e	94.55d-h	94.08g-j	95-27a-d	95.90a	94.67 c- g	94.92a
7.5	95.13a-d	94.18f-j	94.08g-j	95.48ab	95.45a-c	94.60d-h	94.82ab
10.0	94.67c-g	93.83h-j	93.93g-j	95.23a-d	95.22a-d	94.48d-h	94.56b
12.5	94.33e-h	93.51ij	93.44j	95.11b-e	94.91b-f	94.27f-i	94.26c
$\overline{SX}$	0.2407						0.0983
Probability level	0.05						0.01

Within column and row values followed by different letter (s) are significantly different by DMRT.

Among the treated wheat seeds, the highest germination was found in Mahogoni treated wheat seeds and the lowest in Hijal treated wheat seeds.

Percent germination was always higher in wheat seed treated with leaf extract than seed extract. Among solvent extracts, the highest germination was observed in water extract of Mahogoni and the lowest in acetone extract of Hijal. Germination of wheat seeds decreased gradually with increase of doses. All the tested plants did not show any adverse effect on germination of seeds up to 90 days of treatments. The present findings are almost in agreement with those of Islam (2001); Khaire *et al* (1992), Gupta *et al.* (11988), where they reported that seeds treated with plant materials did not adversely affect the seed germination. Farmers may use these plant extracts in their storage structure for management of stored grain pests without any adverse effect on germination of treated seeds.

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