Project Title:

The Efficiency of Seed Cleaning Machinery and Some Herbicides on Weed Control, Wheat Yield, Yield Components and Quality

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Introduction:

Weeds are described as unwanted wild plants or plants out of place. Weeds are growing with economical plants such as horticultural plants and field crops, causing a lot of problems to the crop plants, including the competition with crop plants on the land allocated, sunlight, soil moisture and essential minerals required for plant growth, and development in the field, and causes yield reduction rates between 30 to 50 % of the total wheat yield, problems to the soil quality and productivity as well as many problems to the environment and people who are working in the field (1).

During harvesting process, some of the weed seeds will come with the crop seeds causing reduction in the quality of the grain yield, grade and price, therefore may not be suitable for human consumption, and even in some cases the grain may not be suitable for animal consumption due to the poisonous substances or bad smell or odor caused by weed seeds or other parts of the weed plants, sometimes existing of weed seeds or their residues

with the crop seeds may lead to unsuitability of the wheat seeds or it's flour to be used in food industries.

In addition to the above, existing of weed seeds with wheat seeds will minimize the possibility of wheat seeds to germinate due to the exudation of some chemical substances by weed seeds during germination that affect the wheat seed germination and its growing (allopathic effects).In order to control or to minimize all these problems, it was always necessary to control weed plants (1).

Weed control by herbicides is one of the best methods because it is easy, not expensive and the results appear soon (5), but herbicides affect negatively on the environment, human health and on animals in addition to beneficial insects like honey bee finally reaches the valuable soil micro-organisms and underground water (4); these microorganisms are in charge of many useful activates in the soil, in addition the herbicides may cause pollution to the crop itself. So many researches have been conducted and others are still on the way to find new methods to control the weeds (3), like using machinery in soil preparation and crop serving, or using medicinal plant extracts (5).

But there are indirect methods for weed control; such as using of cleaning machines for wheat seeds which are going to be used for both sowing and human consumption, or even to be used in food industries. During 1999, FAO under UNSCR 986 program for agriculture have brought many mobile machines to Kurdistan Region Government and later on 2004 a big stationery seed processing plant have been established in Zewi, 40 km to Sulaimani; but none of these machines was studied to find their efficiency for weed control. The machines used in the seed cleaning process are in different types and capacities, do their work on several basis; some of these machines use air flow in different speeds (called air screening separators) or pneumatic separators. Other machines use vibration and specific weight or sieves with different pores diameters to separate weed seeds from the crop seeds and in other ways electricity is used or dented cylinders to separate different seeds (2). But till now it is not clear which air speed or flow, vibration, diameter of sieves, electric power is suitable for each kind of weed seeds.

Objectives (goals):

The objectives of this study are to find the best ways for control of weed plants in the wheat fields, in order to minimize losses as much as possible; this will lead to increase the yield, land productivity and improves the quality of the crop yield, also to find the best machinery combinations that can be used to separate weed seeds from wheat seeds, which will include the proper air speed (velocity), the best air discharge (volume) capacity, different sieve holes diameter that gives best results in weed control to remove weed seeds from wheat seeds, comparing with using different types of the most popular herbicides used to control weed plants existed in the wheat fields.

Research Plan:

Research plan includes conducting of two experiments, as below:

1- First Experiment:

A factorial experiment using Randomized Complete Block Design (RCBD) with four replications will be conducted in the green house, by seeding the wheat seeds in pots, consisting three factors, as the following:

Factor A (machinery): This will be on the machines and equipment's used to clean wheat seeds from weed seeds that may exist with it. This factor consists of four levels as the following:

1- Air velocity (speed) directed to the seeds while cleaned by the machine (m/sec).
2- Volume (discharge capacity) of the air directed to the seeds while cleaned by the machine (m^3/hr.).
3- Sieve bores diameter, which seeds will go through in the cleaning process (*mm*).

4- Control (Seeds without treatment, no cleaning machines).

Factor B (Herbicides): The most common herbicides used to control weeds in the wheat fields will be selected, with four levels as the following:

1- A selective herbicide to control broad leave weeds.
2- A selective herbicide to control narrow leave weeds.
3- Non selective herbicides used to control broad and narrow leave weeds.
4- Control (without herbicide).

Factor C (soil conditions): as the soil is a natural seed bank, it is important to find out, whether the weed seeds are from the soil or not, this factor will be in three levels:

1- Sterilized soil.
2- Soil taken from Bakrajo (first location) without sterilization.
3- Soil taken from Sharazoor (second location) also without sterilization.

2- Second Experiment:

It is a field experiment, will be carried in Bakrajo. It is also a factorial experiment, studying three factors implemented in a Randomized Complete Block Design (RCBD) with four replications, as follow:-

Factor A (machinery): this will test the cleaning machinery type and facility that is most suitable to clean wheat seeds from weed seeds, mainly will be in the following but not limited, new machines or facilities will be tested:

1- Air velocity (speed) directed to the wheat seeds that is going to be cleaned from weed seeds (m/sec).
2- Air discharge capacity (volume) directed to the wheat seeds that is going to be cleaned from weed seeds (m^3/hr.).
3- Sieve bores diameter, which the grain will go through and it is expected to separate seeds according to their shapes and sizes (mm).
4- Control (wheat seeds without cleaning by the machine).

Factor B (Herbicides): this will be carried out in the field to find how much herbicide can eliminate (control) weeds which are

growing in the wheat fields; and levels will be the same of the first experiment (the green house) as the following:

1- A selective herbicide to control broad leave weeds.

2- A selective herbicide to control narrow leave weeds.

3- Non selective herbicide to control broad and narrow leaves weeds.

4- Control (without herbicide).

Factor C (soil condition): this factor will also be applied to the field, with two levels:

1- Sterilized soil.

2- Non sterilized soil (natural condition)

The second experiment will be replicated two times (two different years).

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