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THE ANALYSIS OF THE OCCUPATIONAL SAFETY AND HEALTH REGULATIONS ENFORCEMENT IN SEED TREATMENT APPLICATION

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Abstract

The application of seed treatment in the preparation of seed material significantly improves its quality. Treatments contribute to plant protection throughout its development process. Once bought, the seed material of qualified or selected category is already treated and ready to plant. Most farms, however, prepare the seed material or some part of it on their own. The procedure is regulated by the Regulation of the Minister of Agriculture and Rural Development of June 24, 2002 concerning occupational safety and health of application and storage of crop protection chemicals, mineral and organomineral fertilizers. The goal of the thesis was to examine the compliance with the effective laws by the farms based in Wielkopolska, Poland. The obtained results demonstrate that the majority of farmers do not apply any crop protection measures for seed treatment. The process takes place in improper conditions, and the seed leftovers are not used in compliance with the regulations.

Keywords: seed material, seed treatment, crop protection measures, hazardous products, environment

INTRODUCTION

Seed material is a basic fundamental element in the plant production process. The high quality of seed preparation conditions the achievement of high crop productivity (Orzeszko-Rywka *et al.* 2011). In order to improve the value of sowing material and its efficiency, there are various seed refinement methods applied. The most important and widely used means to improve the seed material quality are chemical preparations (Ćwintal 2010, Ćwintal *et al*. 2010). Professional and proper process of seed treatment requires the application of technical equipment (Nawrocki *et al.* 2013, Chojnacki and Dulcet – 2009, Zbytek *et al.* 2015). It is one of the basic means preventing seeds from diseases and pests, from planting to blooming. As a result of treatment, the pests inside seeds and on their cover are eradicated (Fiedorow *et al.* 2004, Horoszkiewicz *et al.* 2013, Panasiewicz *et al.* 2007a,b). The sprouting seeds are exposed to fungi and phycomycetes including Pythium, Fusarium, Ascochyta, Botrytis, Rhizoctonia (Horoszkiewicz *et al.* 2013, Pięta *et al.* 1998, Sharma and Singh 2003). Therefore, it is important to apply proper chemicals aimed at the reduction of crop loss caused by fungal seed-borne diseases. Seed treatment is integral to the initial growth of plants, which is the foundation of their future productivity (Sawińska 2008, Montfort 1996, Dawson and Bateman 2000, Krzyzińska *et al.* 2004, Sawińska *et al.* 2014). Substances used for seed treatment, however, are chemicals and their negative impact on the environment cannot be underestimated. . Therefore, it is essential to comply with safety and health regulations provided in the Regulation of the Minister of Agriculture and Rural Development of June 24, 2002 concerning occupational safety and health of application and storage of crop protection chemicals, mineral and organomineral fertilizers (Dz.U. 2002 nr 99 poz. 896). Non-compliance with the Regulation may result in the environmental contamination and crops intoxication. The outdated or unused seed treatments, as well as their packaging, are on the list of hazardous wastes, whose disposal is regulated by the Act of June 13, 2013 on packaging and packaging waste management (Dz.U. 2013 poz. 888). It is necessary to mention that the population increase and economic development contribute to the environmental pollution Iżykowska-Kujawa 2013, Kuboń and Kurzawski 2013, Osuch *et al.* 2016a,b), whereas technological advancement in rural areas results in problems with the environmental protection (Daniel *et al.* 2012, Osuch *et al.* 2015c). After Poland's EU accession we are obliged to take any measures to reduce the negative effects of wastes (especially hazardous ones) on people and the environment (Boer and Boer 2007, Czarnocki and Paluszkiewicz 2013, Kotovicova 2010, Osuch *et al.* 2015a). The nonreturnable plastic packaging of seed treatments (available in various capacities) combined with incorrect seed management only add to the gravity of the situation. Apart from the formation of hazardous waste, they

cause penetration of biogenic substances into watercourses and soil contamination. Thus, a proper waste disposal and storage of seed material are as equally important as precaution of excess seeds and effluents from seeder clean-up (Osuch *et al.* 2015b).

STUDY OBJECTIVE, SCOPE AND METHODOLOGY

The analysis confirms the need to verify if the regulations of occupational safety and health regulations are properly enforced by Polish farmers during seed treatment. 40 randomly selected family farms of different sizes and specialties were examined, all of which located in Wielkopolska, Poland. The study consisted of individual interviews with farm owners who afterwards were asked to fill in surveys; complete anonymity was ensured. The participants answered the following questions:

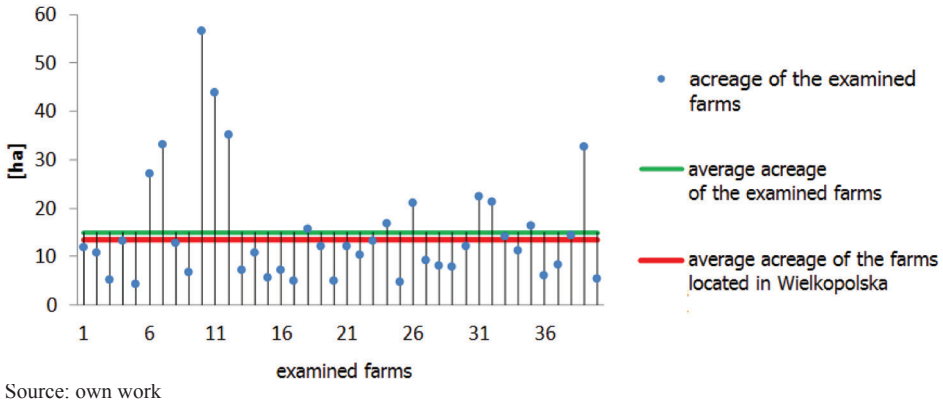
1. What is your farm acreage?
2. Do you apply chemicals for seed treatment?
3. How do you treat seeds?
4. What happens to the treated seeds, which were not used for planting?
5. How do you manage the seed treatments, which date has expired or are unnecessary and with their packaging?

STUDY RESULTS AND ANALYSIS

As indicated in the methodology section, the study covered 40 farms located in Wielkopolska, ranging in the acreage from 4.32ha to 54.63ha, which are presented in detail in Figure 1. For comparison, according to the data provided by the Agency for Restructuring and Modernisation of Agriculture (ARMA) on its website, the average acreage of Wielkopolska farmlands is equal to 13.43ha.

The average acreage of the farms being the subject of the examination was by over 1.5ha larger, compared to the average acreage of the farms across the Wielkopolska region. Figure 2 presents the percentage share of the farms applying seed treatments: 34 in 40 respondents declared that they apply seed treatments on a regular basis.

Seed treatments belong to the group of hazardous substances. They appear in the form of a liquid or dry powder, where the latter causes significant dust. According to the safety and health regulations, the application of treatments requires to be carried out using personal protective equipment consisting of gloves, mask, work shoes, overalls or other protective suit. The study results show that most farmers do not use any protective measures in the course of seed treatment procedures. Figure 3 presents in detail the protective measures applied by the respondents.



Source: own work

Figure 1. The acreage of farms

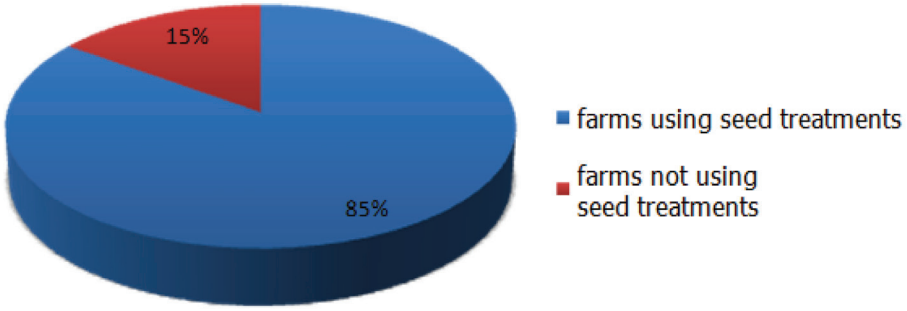


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Figure 2. The share of farms using seed treatments

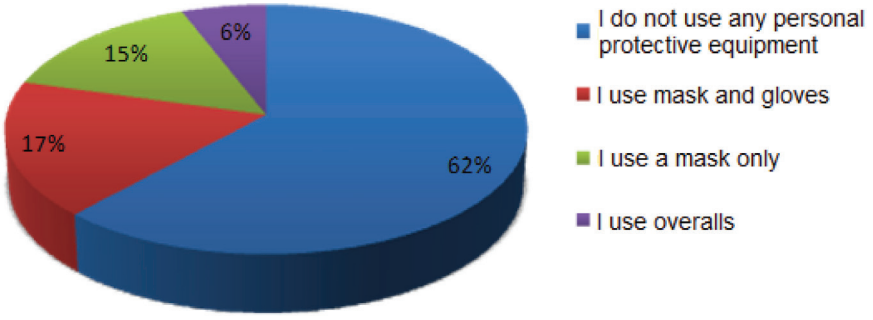

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Figure 3. The use of personal protective equipment

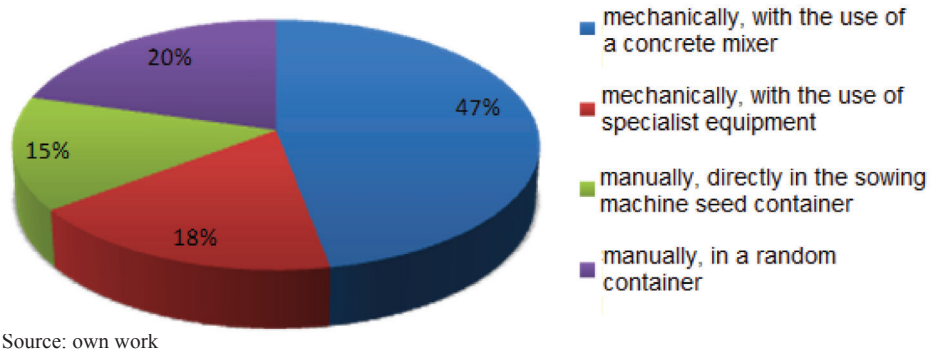

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Figure 4. Methods of seed treatment

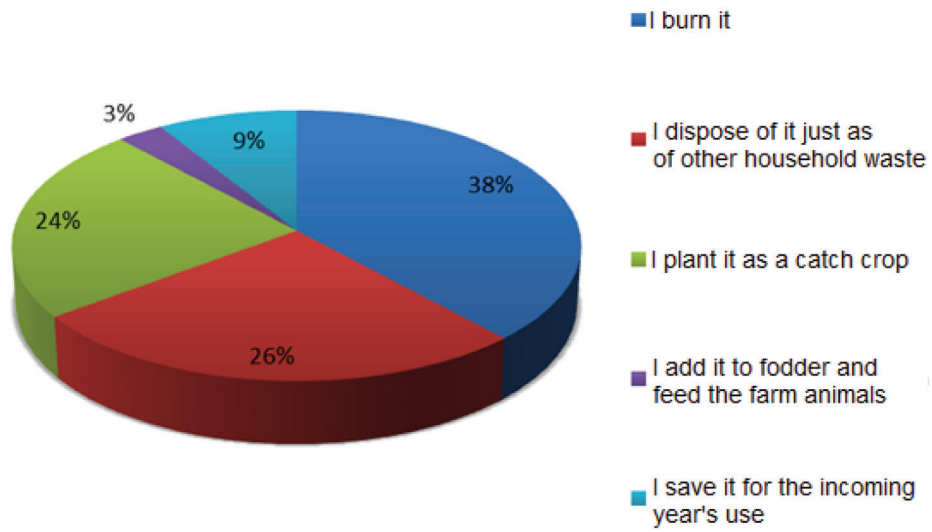

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Figure 5. Methods of excess seed processing

The statistics presented in the above-mentioned figure are a result of little awareness of the risks arising from not using any personal protective equipment. The exposure of skin and mucous membranes to hazardous substances, and their presence in the inhaled air, may cause poisoning and skin irritation. The side effects do not appear immediately after farmer's contact with the chemicals used for the seed treatment, but even few years afterwards. Not to challenge the procedure safety and to guarantee high quality of the treated seed material, the treatment must be carried out with the use of specialist equipment. The studies

indicate (Figure 4) that the majority of the examined farmers treat seeds employing concrete mixers not adapted to this purpose.

The most likely cause of this situation is economic status of the farms. According to the literature (Muzalewski 2000, Osuch 2015, Osuch *et al.* 2015d), Polish farms are undercapitalized, therefore cannot afford professional agricultural machinery. Prior to its preparation, the demand of seed material needs to be quantified. If under calculated, it will require the preparation of additional material, if over calculated, the excess will be a subject to disposal. The farmers apply various methods of processing the seed material leftovers (Figure 5), either burn it, or plant catch crops, or save it for the incoming year's use. The most disturbing is the fact that 3% of the respondents admit to add treated seed leftovers to fodder.

Seed treatment packaging and unnecessary or outdated seed treatments belong to the group of hazardous wastes, and by the effective normative acts should be returned to the purchase points. In reality, they are most often burned in the in-home boiler rooms (Figure 6). Only a small part of the farmers returns the excess seed treatments and their packaging to the specialist shops they were bought at.

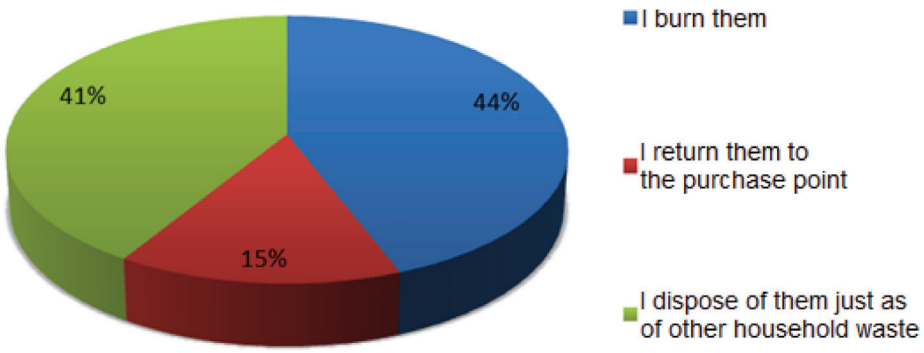

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Figure 6. Waste from seed treatment

CONCLUSIONS

The studies and their analysis allow for drawing the following conclusions:

1. The familiarity with occupational safety and health during seed treatment application among the farmers is insufficient, which can have harmful effects on both their health and the environment.
2. The extent of agricultural mechanization of the Polish farms is too low, because of which the procedures are carried out with the use of unadapted equipment.

3. Treated seeds are used by the distinct majority of Polish farms. In order to ensure that seed treatment and obligatory procedures take place in compliance with the normative acts, the farmers require adequate tutorial.

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