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CAUSES OF RAPE SEED SHEDDING *

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A b s t r a c t. Multi-year research has proved that the level of losses caused by seed shedding can vary from 24 to 82 kg/ha (0.7-2.3 % of crops) on healthy plantations and even up to 450 kg/ha (12 % of the yield) on plantations with diseases and pests. The range of losses also depends on the variety, the chemical agents used to prevent the siliques from cracking, and on the weather conditions during the final period of the plants' maturation. It has been shown that seed shedding increase always appeared after a rainfall, when silique moisture decreased significantly. During sunny weather, losses in seeds were very little, because the siliques had a great mechanical strength at that time.

K e y w o r d s: seed shedding, rape variety, moisture, drying dynamics

INTRODUCTION

Research started many years ago has shown that losses appearing during the final phase of maturation and during harvest ranged globally from 10 to 15 % of the yield, and in unfavourable years even up to 35 % [3]. The range of losses depends most of all on the technology of harvest, harvester work parameters, maturity of the harvested plants [4]. Varietal features [2] which concern silique resistance to cracking also influence the range of losses, as well as the appearance of silique diseases and stem pests, which cause premature maturation of plants, easier silique cracking, and seed shedding [1]. Seed shedding is often treated as one of the methods to estimate particular varieties according to their usefulness for mechanical harvest.

Knowledge of the causes of seed shedding may, therefore, be useful to estimate the mechanisms which cause cracking of siliques, and may help limit the seed losses which appear during rape maturation.

METHODS

Moisture of seeds and siliques, as well as seed shedding were estimated in the following varieties: Ceres, Mar, Bolko and Liporta.

Additionally, on the Ceres variety, the SPODNAM agent was used (according to the producer recommendations), which limits siliques cracking and seed shedding.

Measurements were started a few days before a particular variety reached technical maturity and were continued till late full maturity. In order to estimate the dynamics of plant drying, the moisture of siliques and seeds was measured three times a day (at 8 a.m., 1 p.m., and 6 p.m.), according to the obligatory standards.

The results obtained allowed us to estimate moisture changes as a function of time and thus, to determine the dynamics of plant drying.

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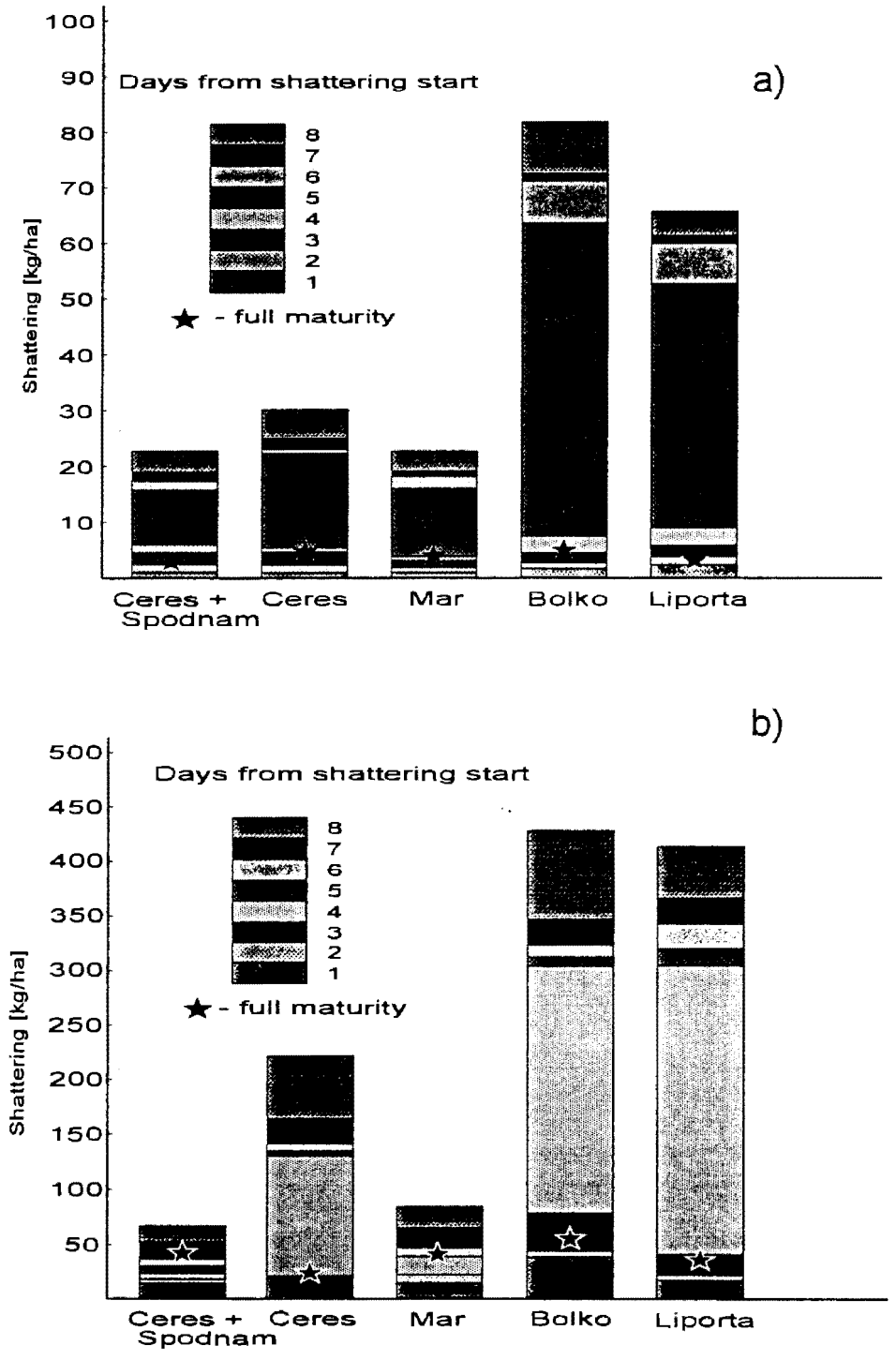

Fig. 1. Seed losses caused by shedding on a healthy plantation (a) and plantation with diseases and pests (b).

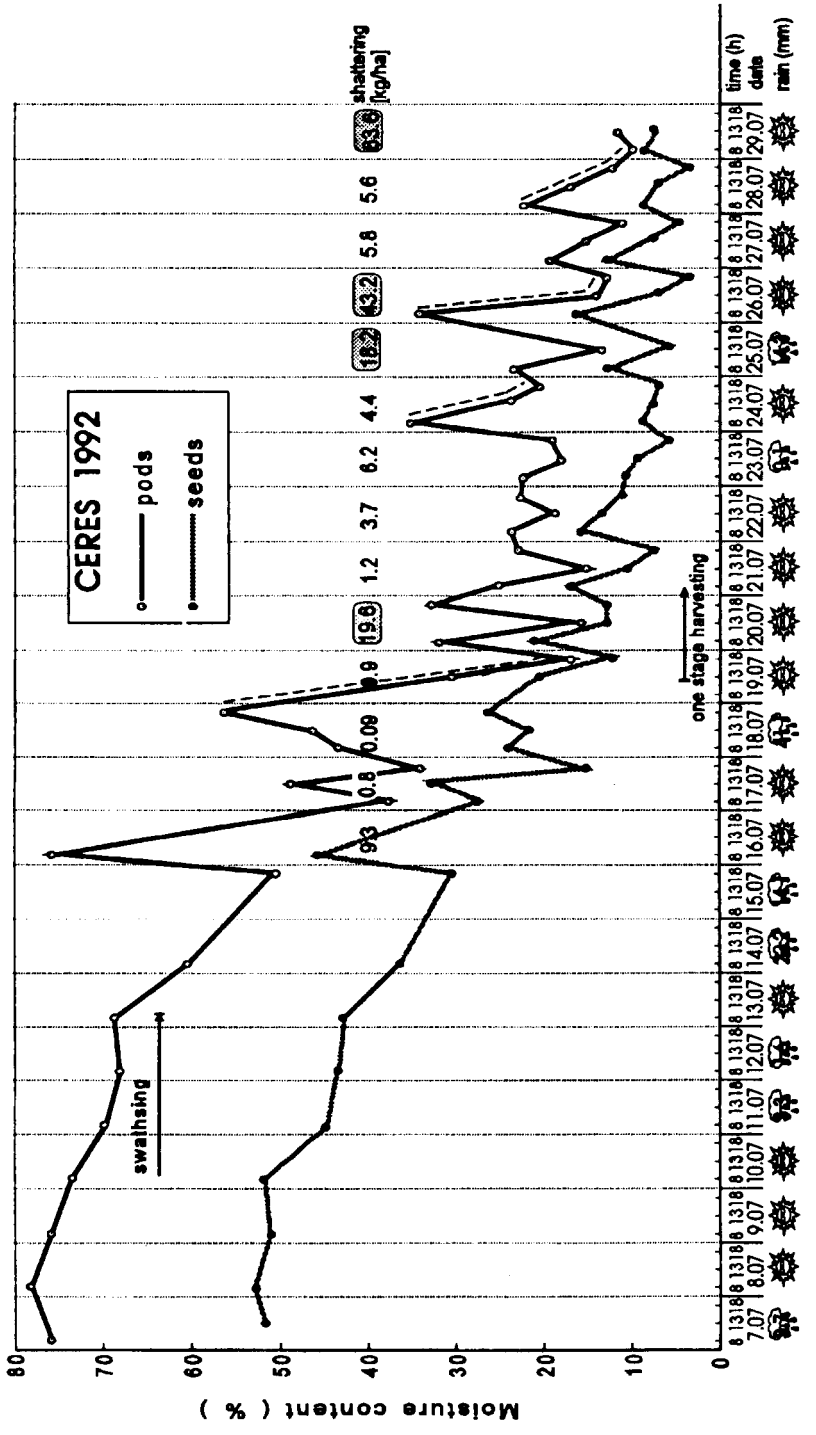

Fig. 2. Dynamics of rapeseed drying.

The evaluation of seed shedding was performed on a selected plantation, where measuring stands were situated. Shedded seeds were caught in six gutters of the total area of 0,5 m^2 x 3 replicates for each variety. The gutters were placed in between rape rows. The measurements were carried out at a specified time every day. From the mass of shedded seeds, losses of seeds by shedding were calculated per hectare.

Using the SDOO data, the weather data were recorded for the research period (wind speed, amount and duration time of rainfalls).

RESULTS

On the basis of the research it was found that the lowest shedding (about 24 kg) occurred for the Ceres variety after using the SPODNAM agent and the Mar variety from the healthy plantation (Fig. 1a). On the plantation affected with diseases and pests the amount of shedded seeds was almost 5 times higher (Fig. 1b). It concerned especially the Bolko and Liporta varieties, where the losses reached almost 450 kg/ha, i.e., almost 10 % of the whole biological yield of seeds. It should be mentioned that a significant portion of those losses appeared the next day after full maturity. The cause of those losses could be explained after specific analysis of the dynamics of silique drying during rape maturation period considering also the process of seed shedding.

An example of the dynamics of silique and seed drying is presented for the Ceres variety (Fig. 2). On that basis it can be stated that rape siliques are built of a very absorptive tissue rapidly changing its moisture depending not only on rainfalls or dew but also on air humidity, wind speed, and state of plant maturity. It has also been observed that the greatest amount of shedded seeds always appeared after rainy periods (wet and weak siliques were damaged even by the softest wind), when the siliques had reached the greatest moisture content. At that time, however, no signifficant increase in shedding was noticed, because wet siliques - even partly damaged - did not open by themselves - lack of elastic forces. It happened after they dried (moisture decrease and associated seed losses are marked with the dashed line). No great losses of seeds were noted during constant sunny, or even windy weather, because dry siliques had high resistance and only a quite strong mechanical force was able to damage them. This phenomenon was documented by the results of a three-year research involving various varieties.

CONCLUSIONS

1. Signifficant differences in silique cracking and seed shedding of the investigated varieties were observed. The smallest amounts of shedded seeds were noted in Mar and Ceres varieties (24, 30 kg/ha in healthy plants), while the greatest amounts - in Liporta and Bolko varieties (68 and 84 kg/ha, respectively).

2. Seed shedding in plants with silique diseases and stem pests was several times higher (in Liporta and Bolko varieties the losses reached 450 kg/ha).

3. On the basis of many-year observations and investigations, carried out on various varieties of winter rape, it was stated that the greatest amounts of shedded seeds always appeared after a significant growth followed by a decrease in silique moisture.

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PRZYCZYNY SAMOOSYPYWANIA NASION RZEPAKU

Przeprowadzone wieloletnie badania wykazały, że wielkość strat nasion powodowana samoosypywaniem może wynosić od 24 do 82 kg/ha (0,7-2,3 % plonu) na

plantacjach zdrowych i nawet do 450 kg/ha (12 % plonu) na plantacjach porażonych chorobami i szkodnikami. Zakres występujących strat uzależniony jest również od odmian, stosowanych środków chemicznych zapobiegających pękaniu łuszczyn, a także od przebiegu pogody w końcowej fazie dojrzewania roślin. Wykazano, że wzrost samoosypywania nasion występuje zawsze po opadach deszczu i następującym po nim wyraźnym spadku wilgotności łuszczyn. W czasie trwania słonecznej pogody straty nasion występują jedynie w ilościach śladowych bowiem łuszczyny charakteryzują się wtedy znaczną wytrzymałością mechaniczną.

S ł o w a k l u c z o w e: samoosypywanie, odmiany, wilgotność, dynamika schnięcia.