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Sensitivity Assessment of Varieties, Effectiveness of Weed Control by Selected Herbicides, and Infection of the *Fusarium* in Maize (*Zea mays* L.) Cultivation

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Abstract: The amount of maize yield depends on many factors. Among them, plant health plays a significant role. Herbicide selectivity (of mesotrione, 2,4-D, and bromoxynil) for different maize varieties was assessed in greenhouse experiments. The effectiveness of herbicides (MCPA, 2,4-D + dicamba) and spraying mixture of the herbicide MCPA with mepiquat chloride was tested on *Chenopodium album* L. and self-seeding winter oilseed rape (*Brassica napus* L.). The genetic distance between selected maize varieties and species composition of pathogens of the genus *Fusarium* isolated from the seeds of the discussed crop were examined. Research results indicated that individual herbicides differed in the selectivity in relation to maize, which depended on the crop variety. The selected herbicides showed high efficacy against the plants used in the experiment. The addition of mepiquat chloride to the composition of the spraying liquid did not affect the level of weed control. No relationship was found between the genetic distance of maize varieties and their sensitivity to selected herbicides. The presence of *Fusarium subglutinans*, *Fusarium proliferatum*, and *Fusarium verticillioides* was found in the samples of maize varieties.

Keywords: *Zea mays* L.; herbicide; efficacy; selectivity; *Chenopodium album* L.; *Brassica napus* L.

1. Introduction

The application of herbicides is considered the most cost-effective method of weed control in developed countries [1]. Herbicides may, however, contribute to phytotoxic effects in a crop [2]. It is necessary to study the selectivity of these preparations in relation to different varieties, because intraspecific genetic distinctiveness can contribute to a different reaction of plants to individual substances [3]. Damage to plants by herbicides may make them more susceptible to infestation by diseases.

Synthetic auxin herbicides affect the increased regulation of auxins in plants, leading to disruption of the balance of natural plant growth hormones, which impair and differentiate normal growth and cause abnormal uncontrolled cell division and uncontrolled growth and damage to chloroplasts, membranes, and vascular tissues [4]. Synthetic auxin herbicides such as 2,4-D and dicamba are important systemic herbicides in the control of dicotyledonous weeds [5,6].

Mesotrione is a substance that belongs to the inhibitors of the γ -hydroxyphenylpyruvate dioxygenase (HPPD) enzyme [7]. HPPD participates in the transformation of tyrosine into plastoquinone and

tocopherol [8]. As a result of blocking the enzyme by the herbicide, the synthesis of carotenoids is disturbed, which leads to chlorophyll degradation [9]. The action of these substances is manifested by plant whitening. Herbicides containing the above substance are intended to control dicotyledonous and monocotyledonous weeds in maize plantations [10].

Bromoxynil is an active substance classified as an inhibitor of photosystem II [11]. The mechanism of action of this group of herbicides is based on binding a protein that should be bound to plastoquinone Q_b . The flow of electrons from plastoquinone Q_a to plastoquinone Q_b is prevented as a result of blocking the protein, and, as a consequence, the photosynthesis. Plant chlorosis and necrosis are the symptoms of the effects of substances belonging to photosystem II inhibitors [12].

The use of mepiquat chloride increases the physical strength of the stems, which is manifested by increased periderm puncture force, stem bending strength, increased dry matter density per cm, stem diameter, and lignin accumulation [13]. Mepiquat chloride spraying procedure significantly affects plant height, leaf area index (LAI), dry matter production (DMP), and baby corn yield [14]. Currently, the combined use of agrochemicals, including herbicides with growth regulators, is becoming an increasingly frequent practice [15]. However, research on the effectiveness of combined protection agents and their phytotoxicity to crops is necessary.

In turn, pathogens of the genus *Fusarium* infect many plant species around the world, including maize. They contribute to decreased yield quality and quantity [16]. Contamination of harvest with mycotoxins, which are dangerous to human and animal health, is a major problem associated with the occurrence of pathogens of this type [17].

The aim of the study was to assess selected factors affecting the health status of different maize varieties and the effectiveness of controlling the weeds occurring in this cultivation. Herbicide selectivity for different maize varieties was evaluated. The effectiveness of herbicides and spraying mixture of the herbicide with mepiquat chloride was tested on *Chenopodium album* L. and self-seeding winter oilseed rape (*Brassica napus* L.). The genetic distance between selected maize varieties and species composition of pathogens of the genus *Fusarium* isolated from the seeds of the discussed crop were also the aims of the study.

2. Materials and Methods

2.1. Greenhouse Experiments

Greenhouse studies were conducted at the Department of Agronomy at the Poznań University of Life Sciences, based on two experiments. In each experiment, plants were sown into 0.7 L pots containing a sterile commercial soil mix with the addition of macroelements and microelements (specification: pH 5.5–6.5; NaCl 1.9 g NaCl/dm³; NPK + Mg – (14 – 16 – 18 + 5) 0.8 kg/dm³). The pots were subsequently placed in the greenhouse at 26 °C (±4 °C)/19 °C (±4 °C) day/night without additional artificial lighting. The relative air humidity was maintained at 50 to 80%. Substrate condition was monitored daily so that the humidity oscillated around 70% of the full water capacity. Water shortages were supplemented with tap water, if necessary. The spraying procedure was performed at the BBCH 13–14 stage (i.e., in the developmental phase of 3–4 leaves); the control sample was not sprayed. Four replicates were performed in a completely random order in two experimental series. The treatments were carried out using a laboratory sprayer equipped with a set of TeeJet flat spray tips, type DGTJ60 11003, with a capacity of 300 L/ha, at an operating pressure of 0.3 MPa. The sprayers were located at a height of 50 cm above the plants.

2.1.1. Experiment I

The experiment concerned the assessment of herbicide selectivity for maize (*Zea mays* L.)—traditional and “stay green” varieties. Fodder maize (*Zea mays* L.) cultivated for grain, widely available on the market, was selected for the experiment. According to the EPPO methodology (PP 1/50(3)), a double recommended dose was used in herbicide phytotoxicity studies. The assessment of crop

susceptibility to herbicides was carried out 7, 14, and 21 days after treatment (DAT) by determining the damages (chlorosis, necrosis, stunting, torsion). The assessment consisted of visual estimation of the occurrence of morphological changes of the crop in relation to control, according to a scale from 0–100%, where 0%—no damage and 100%—complete destruction.

Stage a—32 maize varieties, whose breeders were Syngenta Polska Sp. z o.o., and Limagrain Central Europe served as the experimental material. This experiment tested the selectivity of a plant protection product containing mesotrione (Callisto 100 SC, Syngenta Polska Sp. z o.o. Warsaw Poland) compared to test plants. The herbicide was used at a dose of $3 \text{ L} \cdot \text{ha}^{-1} = 300 \text{ g s.a.} \cdot \text{ha}^{-1}$.

Stage b—12 maize varieties bred by Limagrain Central Europe were selected for testing. In this experiment, the selectivity of herbicides containing 2,4-D (Esteron 600 EC, Dow AgroSciences Polska Sp. z o.o. Warsaw Poland) was tested at a dose of $2 \text{ L} \cdot \text{ha}^{-1} = 1200 \text{ g s.a.} \cdot \text{ha}^{-1}$, and bromoxynil (Bromotril 250 SC, Adama Polska Sp. z o.o. Warsaw Poland.), at a dose of $2 \text{ L} \cdot \text{ha}^{-1} = 350 \text{ g s.a.} \cdot \text{ha}^{-1}$, was tested in comparison to test plants.

2.1.2. Experiment II

Based on the analysis of the results carried out in experiment I, two maize varieties were selected for further research: traditional SY Cooky FAO 220-230 and “stay green” NK Ravello FAO 210. The selection of these varieties allowed comparison reaction of traditional and stay green varieties to herbicides. The breeder of both varieties was Syngenta Polska Sp. z o.o. The selected varieties did not show morphological changes in reaction to the applied herbicides with a different mechanism of action. The study used the herbicides given in Table 1.

Table 1. Herbicides applied in experiment II and III.

No.	Plant Protection Products	Producer	Active Ingredient	Dose (L/ha)	Dose (g a.i./ha)
1	Chwastox Extra 300 SL	CIECH Sarzyna S.A., Poland	MCPA (300 g/L)	3	900
2	Chwastox Extra 300 SL + Mepik 300 SL	CIECH Sarzyna S.A., Polska + Innvigo Sp. z o.o., Poland	MCPA (300 g/L) + mepiquat chloride (300 g/L)	3 + 1.3	900 + 390
3	Aminopielik Standard 600 SL + Dicash	ADAMA Manufacturing Poland S.A. + Sharda Europe b.v.b.a., Kingdom of Belgium	2,4-D (600 g/L) + dicamba (480 g/L)	0.5 + 0.5	300 + 240

2.1.3. Experiment III

The experiment concerned the evaluation of the effectiveness of selected herbicides from the group of growth regulators against two weed species: *Chenopodium album* L. and self-seeding winter oilseed rape (*Brassica napus* L.). Evaluation of the effectiveness of tested preparations was carried out 14 days after spraying. The effectiveness of the agents was evaluated visually in relation to the control (without spraying), according to a 0–100% scale, where 0%—no effectiveness and 100%—full effectiveness. The study used the herbicides given in Table 1.

2.2. Laboratory Experiments

2.2.1. Methodology—Genetic Similarity of Varieties

A sample of 0.1 g fresh young tissues was collected from each cultivar and ground into a fine powder, using liquid nitrogen in the TissueLyser II system (Qiagen, Hilden, Germany). Total genomic DNA was extracted using a commercially available DNA extraction kit (DNeasy Plant Mini Kit, Qiagen, Hilden, Germany), following the manufacturer’s instructions. DNA was quantified using a Picodrop Microliter UV/Vis Spectrophotometer (Saffron Walden, United Kingdom, London). The PCR was run in a TProfessional thermocycler (Biometra, Jena, Germany), using a set of 30 simple sequence repeat (SSR)

primers [18]. 100 pairs of primers were tested in a preliminary experiment. On the basis of results of this experiment, we selected 30 SSR primers. Sequences of all tested primers came from a database [19]. The PCR reaction mix (15 µL) included the following: 70 ng genomic DNA, 100 µM each dNTP, 0.2 µM forward and reverse primers, 1x Taq polymerase buffer, and 2 U Tag polymerase (Thermo, Waltham, USA). Amplifications were carried out for 35 cycles, each consisting of a denaturation step of 40 s at 95 °C, followed by an annealing step of 30 s at 55 °C and an extension step of 1 min at 72 °C, with a final extension at 72 °C for 7 min. The amplified products were analyzed on the QIAxcel system with the QIAxcel HighResolution Kit (Qiagen, Hilden, Germany) following the AM420 method. The five cultivars (NK Cooler, Delitop, NK Ravello, SY Cooky, and Drim) were scored for the presence and absence of the SSR bands. Data were entered into a binary matrix as discrete variables, with “1” for the presence and “0” for the absence of alleles. Genetic similarity (GS) for each pair of cultivars was estimated, based on the coefficient proposed by Nei and Li (1979) [20], defined as $GS = 2NAB/(NA + NB)$, where NAB is the number of bands shared by cultivars A and B, NA is the number of bands in cultivar A, and NB is the number of bands in cultivar B. The cultivars were grouped using the unweighted pair group method with arithmetic mean (UPGMA). Similarities between cultivars were visualized on a dendrogram.

2.2.2. Identification of *Fusarium* Species

We ensured that 200 maize seeds of each sample were surface-sterilized for 1 min with 1% sodium hypochlorite solution, rinsed twice in sterile distilled water, and dried in a laminar flow cabinet. Two growth media, i.e., potato dextrose agar (PDA) and peptone PCNB agar, were used for fungal isolation. The plates were incubated at 25 °C in the dark for 5–7 days. Using a single spore technique [21], all *Fusarium* isolates were subcultured on PDA, Spezieller Nährstoffarmer Agar (SNA), and carnation leaf agar (CLA). PDA cultures were incubated at 25 °C, and CLA and SNA cultures were incubated at 25 °C under near UV light for two to four weeks. Cultural characteristics were visually assessed as well as by microscopic examination. We recorded the morphology of the colony from cultures grown on PDA. The morphology of macroconidia, microconidia, conidiogenous cells, and the chlamydospores was assessed from cultures grown on SNA and CLA. The morphological identifications of isolates were completed using the criteria of Gerlach and Nirenberg [22] and Leslie and Summerell [21].

1. DNA extraction

Fusarium isolates were grown on PDA plates for seven days, and mycelia were harvested and ground in liquid nitrogen. Total DNA was extracted from ground mycelium of each isolate (~100 mg wet weight) using a DNeasy Plant Mini Kit (Qiagen, Hilden, Germany), according to the manufacturer’s instructions.

2. Species-specific PCR

The primer pairs VER1/2, PRO1/2, and SUB1/2 were used in species-specific PCR assays to identify *F. verticillioides*, *F. proliferatum*, and *F. subglutinans*, respectively [23]. The reaction mixtures were prepared in a total volume of 25 µL with a final concentration of 50 mM KCl, 10 mM Tris-HCl (pH 8.3), 0.2 mM of each dNTP, and 1.5 mM MgCl₂. For each reaction, 0.6 U of Ampli Taq polymerase (Applied Biosystems, Foster City, USA), 15 pmol of each primer, and approximately ~25 ng of fungal template DNA were used. Reactions were performed in a GeneAmp® PCR system 9700 thermal cycler (Applied Biosystems, USA), using the following PCR conditions: denaturation at 95 °C for 5 min, 35 cycles of denaturation at 94 °C for 50 s, annealing at 56 °C for 50 s, extension at 72 °C for 1 min, and final extension at 72 °C for 7 min, followed by cooling at 4 °C until the samples were recovered. The amplification products were visualized in 1.2% agarose gels stained with ethidium bromide [23].

2.3. Statistical Analysis

In all experiments, statistical evaluation of the results was carried out using analysis of variance for orthogonal factorial experiments in the Agriculture Research Manager 8.0 software. The significance of result diversification was assessed by the Fisher–Snedecor test at the significance level of 0.05, while the significance of differences between means was based on the Student–Newman–Keuls test.

3. Results

3.1. Greenhouse Experiments

3.1.1. Experiment I

The examined varieties of maize grown for grain reacted differently to the protection variants. The varieties Kardona, SY Multitop, and Laureen showed the highest sensitivity to the active substance mesotrione in experiments on the phytotoxicity of standard herbicide preparations. The preparation Esteron 600 EC containing the active substance 2,4-D 2-EHE in the form of an ester—a compound from the group of phenoxy acids—caused damage in all maize varieties. The largest damage was recorded in the varieties Laureen, GSS 5829, GSS 8529, Overland, and Golda. Maize varieties showed high tolerance to the herbicide Bromotril 250 SC containing the active substance—bromoxynil. Morphological changes were found in the varieties LG 30.275 and Laureen. The results are shown in Tables 2–5.

Table 2. Sensitivity of maize varieties to the herbicide Callisto 100 SC (mesotrione)—varieties bred by Syngenta Polska Sp. z o.o.

No.	Variety	Phytotoxicity (%)		
		Callisto 3.0 L/ha		
		7 DAT	14 DAT	21 DAT
2	NK Jasmic	0	0	0
3	NK Ravello SG	0	0	0
4	Exapic	3	4	0
5	Drim SG	0	0	0
6	SY Cooky	0	0	0
7	Delitop SG	6	6	0
8	NK Cooler SG	4	3	0
9	SY Contract	11	10	0
10	SY Multitop	11	12	0
11	SY Consistent SG	0	0	0
12	Arobase	10	6	0
13	NK Nekta SG	6	6	0
14	SY Counter SG	1	1	0
15	SY Enigma	0	1	0
16	Nebora	9	6	0
17	NK Magitop SG	3	3	0
18	SY Ondina SG	0	0	0
19	Longitop	3	3	0
20	Kardona	13	9	0
21	Kaivo	0	0	0
LSD _{0.05}		4.7	5.1	0.0

note: SG—stay green.

Table 3. Sensitivity of maize varieties to the herbicide Callisto 100 SC (mesotrione) varieties bred by Limagrain Central Europe.

No.	Variety	Phytotoxicity (%)		
		Callisto 3.0 L/ha		
		7 DAT	14 DAT	21 DAT
2	LG 30.260 SG	5	8	0
3	LG 30.240	3	1	0
4	LG 32.16	2	6	0
5	LG 30.275 SG	0	1	0
6	LG 32.32	2	6	0
7	LG 22.44	8	9	0
8	LG 32.15	16	12	0
9	LG 22.43	9	11	0
10	LG 32.52	13	8	0
11	LG 30.238	2	0	0
12	LG 32.58	4	1	0
13	Laureen	21	15	0
LSD _{0.05}		5.3	6.2	0.0

note: SG—stay green.

Table 4. Sensitivity of maize varieties to the herbicide Esteron 600 EC (2,4-D).

No.	Variety	Phytotoxicity (%)		
		Esteron 2.0 L/ha		
		7 DAT	14 DAT	21 DAT
2	LG 30.260 SG	10	15	0
3	LG 30.240	10	15	0
4	LG 32.16	10	11	0
5	LG 30.275 SG	10	9	0
6	LG 32.32	8	8	0
7	LG 22.44	5	8	0
8	LG 32.15	10	8	0
9	LG 22.43	10	13	0
10	LG 32.52	1	2	0
11	LG 30.238	0	2	0
12	LG 32.58	10	8	0
13	Laureen	18	20	0
LSD _{0.05}		1	1.9	0.0

note: SG—stay green.

Table 5. Sensitivity of maize varieties to the herbicide Bromotril 250 SC (bromoxynil).

No.	Variety	Phytotoxicity (%)		
		Bromotril 2.0 l/ha		
		7 DAT	14 DAT	21 DAT
2	LG 30.260 SG	0	0	0
3	LG 30.240	0	0	0
4	LG 32.16	0	0	0
5	LG 30.275 SG	5	0	0
6	LG 32.32	0	0	0
7	LG 22.44	0	0	0
8	LG 32.15	0	0	0
9	LG 22.43	0	0	0
10	LG 32.52	0	0	0
11	LG 30.238	0	0	0
12	LG 32.58	0	0	0
13	Laureen	4	0	0
LSD _{0.05}		0.6	0	0

note: SG—stay green.

3.1.2. Experiment II

In the experiment, the varieties SY Cooky and NK Ravello showed no damage in any of the protection variants applied. The results are shown in Table 6.

Table 6. Sensitivity of two maize varieties to different herbicide variants.

No.	Active Ingredient	Dose (L/ha)	Dose (g a.i./ha)	Phytotoxicity (%)	
				ZEAMX—SY Cooky	ZEAMX—NK Ravello
				14 DAT	14 DAT
1	Untreated *	-	-	0	0
2	MCPA	3	900	0	0
3	MCPA + mepiquat chloride	3 + 1.3	900 + 390	0	0
4	2,4 D + dicamba	0.5 + 0.5	300 + 240	0	0
LSD _{0.05}				0	0

* non-sprayed control applied for ZEAMX varieties—SY Cooky and NK Ravello, respectively ZEAMX—Zea mays L.

3.1.3. Experiment III

All herbicides showed high weed-killing effectiveness in relation to two weed species, *Chenopodium album* L. and self-seeding winter oilseed rape (*Brassica napus* L.). No statistically significant differences were found between the individual combinations. The highest herbicidal effectiveness in controlling both weed species was recorded for the mixture of 2,4-D + dicamba. The addition of mepiquat chloride to the composition of the spraying liquid did not affect the effectiveness of the herbicide containing MCPA (Figure 1).

Figure 1. Evaluation of herbicide efficacy against *Chenopodium album* L., and *Brassica napus* L (no significant differences).

3.2. Laboratory Experiments

3.2.1. Genetic Similarity of Varieties

A total of 112 SSR markers were detected with the set of 30 SSR primers. The average number of alleles per locus was 3.73, ranging from 1 to 17. The size of PCR products ranged from 63 to 267 bp. The data were computed to estimate genetic similarity between studied five maize cultivars based on Nei and Li's coefficients. The highest genetic similarity (amounting to 0.719) was found between cultivars Delitop and NK Ravello, whereas the lowest genetic similarity (0.310) was found for cv. NK Cooler and Drim (Table 7). The mean value of genetic similarity was 0.523. The SSR markers data were used to group cultivars by the unweighted pair group method of arithmetic means (UPGMA) method. The relationships between cultivars are presented in the form of a dendrogram (Figure 2).

Table 7. Genetic similarity among the studied five cultivars of maize based on 112 SSR markers.

Cultivar	NK Cooler	Delitop	NK Ravello	SY Cooky	Drim
NK Cooler	1				
Delitop	0.478	1			
NK Ravello	0.481	0.719	1		
SY Cooky	0.388	0.597	0.612	1	
Drim	0.310	0.441	0.553	0.652	1

Figure 2. Heatmap of genetic similarity of five cultivars of maize constructed for 112 SSR markers. Cultivars were grouped hierarchically using the unweighted pair group method of arithmetic means (UPGMA).

3.2.2. Identification of *Fusarium* Species

Molecular analyses confirmed the morphological identification of 25 *Fusarium* isolates used in the experiment. PCR products from *F. subglutinans*, *F. proliferatum*, and *F. verticillioides* were 519 bp, 526 bp, and 534 bp in length, respectively. All isolates were tested with the species-specific primers VER 1/2 and PRO 1/2. From the 69% isolates, morphologically identified as *F. verticillioides*, 66% were identified using the VER 1/2 primers, whereas 17% of isolates were morphologically identified as *F. proliferatum*, seven of which were identified using the PRO 1/2 primers.

4. Discussion

Factors determining the size and quality of maize yield involve climate and soil conditions, agrotechnics, including fertilization and plant protection, variety selection, plant density, and date of harvest [24]. According to Adamczyk [25], the amount and quality of the harvested maize was in 40% determined by agrotechnical factors, 30% climatic conditions, and 30% by correct selection of varieties.

Individual varieties may react differently to different herbicides [26]. This has also been confirmed for maize [27]. Since the introduction of these plant varieties with different earliness (FAO) and genetic traits into cultivation, it has become important to determine their herbicide selectivity, as proven in numerous works on the reaction of varieties to chemical plant protection products [28,29].

Information contained in the works of other scientists indicated that the use of mesotrione could contribute to the occurrence of phytotoxicity on maize plantations, which, however, did not have a negative impact on yield [30,31]. In the conducted experiment, this substance contributed to the greatest damage to plants belonging to the varieties Kardona, SY Multitop, and Laureen. Maize plantations also showed signs of phytotoxicity after the application of herbicides belonging to the group of synthetic auxins and bromoxynil. For 2,4-D, damages were observed, such as leaf curling and stem bending and brittleness. On the other hand, yellow and brown leaf discoloration is an undesirable symptom of bromoxynil action [32]. In the tests carried out on all varieties in experiment I, transient symptoms of phytotoxicity were observed after the application of 2,4-D, while bromoxynil contributed to damages to plants of the varieties LG 30.275 and Laureen. In experiment II, however, herbicides from the group of growth regulators did not cause the phytotoxicity effect in the two varieties tested. No relationship was found between the genetic distance of maize varieties and their sensitivity to the applied herbicides. However, testing for herbicide selectivity is important for individual crop varieties. The condition for using the varietal progression of maize carried by maize seed is to recognize the susceptibility of cultivated varieties to herbicidal damage. It is also worth remembering that stress caused by herbicide damage can contribute to greater susceptibility of plants to diseases [33].

Chenopodium album L. is a common weed in maize plantations, and it can contribute to significant yield reduction [34]. Self-seeding oilseed rape can also be a problem in the cultivation of the discussed plant [35,36]. In experiment III, the tested herbicides showed high herbicidal effectiveness against *Chenopodium album* L. and *Brassica napus* L. All herbicide variants contributed to a high level of weed control. Similar results, i.e., high herbicidal effectiveness against *Chenopodium album* L. after MCPA application, were obtained by Majchrzak et al. [37]. Roskamp et al. [38] noted that the applied herbicides containing dicamba and 2,4-D successfully eliminated various weed species, among them *Chenopodium album* L. The addition of mepiquat chloride did not affect the effectiveness of the selected herbicide. This is important from the point of view of the tank mixtures used in agricultural practice in plant protection products.

F. verticillioides was detected in most of the tested isolates. This species is one of the most common pathogens on maize plantations in the world [39]. *F. proliferatum* is another commonly occurring species [40]. Its presence was found in the tested samples. The presence of *F. subglutinans* was also found in the material subjected to the tests. This species is also considered an important pathogen appearing on maize plantations [41]. Such species composition of pathogens belonging to the genus *Fusarium* was also described by other scientists [23].

5. Conclusions

The variety is an important factor affecting the reaction of crop plants to the applied herbicides. The varieties used in the experiments showed different sensitivity to the applied herbicides. No relationship was found between the genetic similarity of individual maize varieties and their reaction to the applied herbicides. The applied herbicides were highly effective against weeds; the addition of mepiquat chloride did not affect the level of control of self-seeding oilseed rape and *Chenopodium album* L. In the tested samples, fungi from the genus *Fusarium* were found, which are often present in maize—*F. subglutinans*, *F. proliferatum*, and *F. verticillioides*. Effective weed control without phytotoxic effects of plant protection products, as well as properly carried out control against fungal pathogens, among which *Fusarium* ssp. plays a significant role, are factors that largely affect the level of maize yield.

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L.S., M.G., and P.S. prepared the references; P.S. revised the manuscript. All authors have read and agreed to the published version of the manuscript.

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