

Biotypes of scentless chamomile *Matricaria maritima* (L.) ssp. *inodora* (L.) Dostal and common poppy *Papaver rhoeas* (L.) resistant to tribenuron methyl, in Poland

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Abstract: Scentless chamomile *Matricaria maritima* (L.) ssp. *inodora* (L.) Dostal and common poppy *Papaver rhoeas* (L.) are species which very often infest winter cereal and winter rape crops. Inhibitors of acetolactate synthase (ALS) are commonly used for control of these weeds. The herbicides are characterised by a single site of action in the plant, which has an influence on selection of the weed population and may result in a rapid development of resistance. In 2012, five seed samples of scentless chamomile and five samples of common poppy were collected from five winter wheat crop fields in Żuławy Gdańskie where the weed species were very poorly controlled. Results of greenhouse experiments showed that two biotypes of scentless chamomile and common poppy were resistant to tribenuron methyl. It was not possible to control resistant biotypes even after use of tribenuron methyl at a dose four times higher than recommended in Poland, it is the first reported case of scentless chamomile and common poppy biotypes' resistance to herbicides. It is not of economic importance but it does prove the growing problem of weed resistance in the country.

Key words: common poppy, resistance, scentless chamomile, tribenuron methyl

Introduction

Results of many research papers show that use of herbicides with the same mechanism of action, results in elimination of sensitive biotypes from the population. Less sensitive biotypes remain uncontrolled and transfer the trait to the next generations. The process of selection occurring for many years, results in dominance of resistant biotypes in the population. It is a mechanism of weed resistance development to herbicides. Those species exhibiting very high fertility are the most susceptible to the process. Such species include scentless chamomile and common poppy.

Sulfonylurea herbicides due to their low cost and high biological activity are the most popular acetylactate synthase (ALS) inhibitors and they are used throughout the world. Prevalence of sulfonylurea herbicide use resulted in the development of resistance to that herbicide group in some weed species i.e. silky bentgrass, blackgrass, and wild oat (Cavan *et al.* 1999; Hull and Moss 2007; Hamouzova *et al.* 2010). In Poland, this group of herbicides currently plays a crucial role in the chemical weed control of winter cereals. Herbicides of the group of sulfonylurea derivatives, such as tribenuron methyl, chlorsulfuron, mezosulfuron + iodosulfuron and iodosulfuron, have been used for weed control in winter cereal cultivation for many years.

The mechanism of weed resistance to ALS is quite well known. Most cases of resistance to ALS inhibitors occur by point mutations. This type of resistance (target-site) is connected with Pro-197 mutation and as a result of this mutation, amino acid proline at the position 197 is replaced with other amino acids (Yu *et al.* 2008; Krysiak *et al.* 2011a; Adamczewski *et al.* 2013). The mutation in position 197 always conferred high (more the 10-fold) resistance to sulfonylureas but resistance to other ALS inhibitors depended on the particular weed species (Krysiak *et al.* 2011a).

Scentless chamomile *Matricaria maritima* (L.) ssp. *inodora* (L.) Dostal and common poppy *Papaver rhoeas* (L.) are the most often found weeds in winter cereals and winter rape. Both species are very competitive especially in cultivation of winter wheat and winter rape, and germinate at the same time as the cultivated plants. In thinned crops, scentless chamomile and common poppy develop very abundant mass which considerably affects yielding. Due to their mass occurrence, they are some of the most troublesome weeds and may be considered ultimate weeds. Their thick stalks dry very slowly, which hinders harvesting of the cultivated plants, especially of winter rape and winter wheat. Cereal grains and rape seeds collected from fields infested with scentless chamomile and common poppy are more contaminated and damp. The economic threshold of harmfulness of scentless chamomile in cereals is 2–5 plants per m². A density of 25 annual

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