

Weed Management in Organic Farming in the New EU Member States and the Acceding Countries - Status Quo and Main Limitations

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Key words: EU, organic farming, weed management, weeds, alien species

Abstract

Under the EU Specific Support Action (SSA) Project CHANNEL ("Opening Channels of Communication between the Associated Candidate Countries and the EU in Ecological Farming"), a survey on the status quo in weed management was conducted in 15 new member and acceding EU states. The focus of the data collection was on three main aspects relevant for the understanding of the current situation, they are: i.) legal and administrative framework, ii.) status quo in practice and iii.) scientific basis. These aspects were covered by separate questionnaires, addressed to different authorities and target groups.

The results of the weed management questionnaire for the target group "experts engaged in practical farming" are presented in this paper. The analysis allowed the identification of a small group of weeds as the main target species of organic weed management. Alien species were reported by almost all countries as an upcoming problem in organic farming. There was conformity among the different countries in regards to the choice of prevention tools, whereas an obvious lack of modern equipment available for practicing mechanical weed control was noted. Within the new EU member states and candidate countries, the economic constraints (lack of available machinery, lack of capital and high economic costs) were stated as the main limitations of weed management success. The economic costs of weed management in general, could not yet be covered by the market prices of organic products. Therefore, the economic pressure and the scope for improving weed management in practice are small. In most countries, the scientific sector (facilities, projects and advisory services) working on weed management issues in organic farming is relatively small. The lack of project funding in this area limits the research profoundly.

Introduction

The EU accession of the new member states in May 2004 has coincided with the review and adjustment of the main instruments of the Common Agricultural Policy (CAP). With regard to the new member states and the acceding countries, it became obvious that the state-of-the-art information of organic farming is at present lacking. The EU-SSA Project CHANNEL ("Opening Channels of Communication between the Associated Candidate Countries and the EU in Ecological Farming"), which ran between the years 2004-2006, was aimed at bridging this gap and improving the knowledge on specific situations in the new member states. 25 project partners from 15 different countries, among them all the newly accessed countries in 2004 and the

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acceding countries Bulgaria and Romania, as well as the old member states Austria, Italy and Germany, participated in the CHANNEL project.

Weed management was chosen as one of the six subjects for data elevation, because it is one of the most difficult and cost-intensive problem faced in organically managed crops (Clark et al. 1998). In the new member states in particular, organic farming is located with a high frequency in marginal or ecologically sensitive landscapes. Organic farming is regarded there as an alternative that allows for the continuation of agricultural production, which helps prevent the abandonment of land.

The working group "Weed Management" elevated data on the following issues: i.) land use and natural frame conditions, ii.) legal and administrative background for weed management, iii.) expert assessments on the status-quo of weed infestation, management practices and limitations in weed management, iv.) scientific and educational background, including an overview on recent research projects.

Materials and methods

The main tools for gathering data were standardised questionnaires addressed to three different target groups: a.) public authorities (governmental and regional bodies), b.) experts (e.g. advisory bodies, farmers' associations) and c.) scientists (research institutes and universities). The questionnaires were distributed to the relevant stakeholders via national representatives of each country. Only experts with a broad overview on their respective countries would be involved in the questionnaires. For countries with a large area under organic farming, multiple answered questionnaires were requested. The results of the weed management group were based on the feedback from an overall of 84 single contributions (questionnaires), among them 24 from administrative bodies, 38 from experts and 22 from the scientific sector. The incoming answers were checked for their quality and reliability using a standardised methodology that included the following parameters: completeness, plausibility, clarity/wording, scientific nomenclature, contradictions between multiple answers, professional focus of the author, spatial representation of the experts, cross checking with existing literature/data sources. Feedback loops with the national representatives were used to clarify identified problems. The country representatives had to be in agreement with the modifications resulting from the data validation and declare the reliability of their data with an official statement.

In addition to hard facts, some subjective assessments were requested, e.g. for the identification of main constraints of the current situation.

Results

Most frequent weed species on arable land

Despite differences in farm size, historical background and other frame conditions, a few weeds that occur in almost all countries had been unanimously listed to cause the main problem in weed control. These were above all *Cirsium arvense* (L.) Scop., *Elymus repens* (L.) Gould., *Chenopodium album* L., *Galium aparine* L. and different chamomile species. It was only in the Mediterranean countries where these species were not listed as being relevant in weed control. Beside the above named, the following species were listed as main targets for weed management (in brackets: number of countries, where it is frequently found): *Amaranthus* sp. (incl. *A. retroflexus* L.) (8), *Matricaria* sp. (incl. *T. perforatum* (Merat) Lainz, *M. recutita* L., *M. discoidea* DC.) (7), *Avena fatua* L. (6), *Convolvulus arvensis* L. (6), *Echinochloa crus-galli* (L.) P.

Beauv. (5), *Apera spica-venti* (L.) P. Beauv. (4), *Capsella bursa-pastoris* (L.) Medik. (4), *Equisetum arvense* L. (4), *Galeopsis* sp. (incl. *G. tetrahit* L.) (4), *Sinapis arvensis* L. (4), *Sonchus arvensis* L. (4), *Sorghum halepense* (L.) Pers. (4), *Stellaria media* (L.) Vill. (4).

Alien weed species relevant to organic farming

Most countries (11 out of 13) reported on the relevance of alien species. The following species had been named as important in organic farming (in brackets the country codes): *Abutilon theophrasti* Med. (SK, SL), *Ambrosia artemisiifolia* L. (SK, HU), *Andrachne telephioides* L. (CY), *Asclepias syriaca* L. (HU), *Avena fatua* L. (LT, LV), *Commelina benghalensis* L. (CY), *Conium maculatum* L. (CZ), *Datura stramonium* L. (AT, HU), *Heracleum mantegazzianum* Sommier et Levier/*sosnowskyi* Manden (CR, EE, LT), *Heracleum sphondylium* ssp. *sibiricum* (L.) A.&G. (LV), *Impatiens glandulifera* Royle (CZ), *Iva xanthiifolia* Nutt. (SK), *Nicotiana glauca* Graham. (IT), *Oxalis pes-caprae* L. (CY), *Panicum* sp. (SK), *Sorghum halepense* (L.) Pers. (HU, SK).

Measures to prevent weed infestation

Crop rotation and primary soil tillage are the main tools used in all countries included in this survey. Except for the Mediterranean countries, the choice of cultivars and sowing density and stubble cultivation were also seen as common tools. Row width adjustment, catch crop or cover crop growing and inter-cropping were common practices in two thirds of the countries. Inter-cropping had been a traditional tool in the Mediterranean countries applied more commonly in small farm holdings. Undersowing was reported by eight countries.

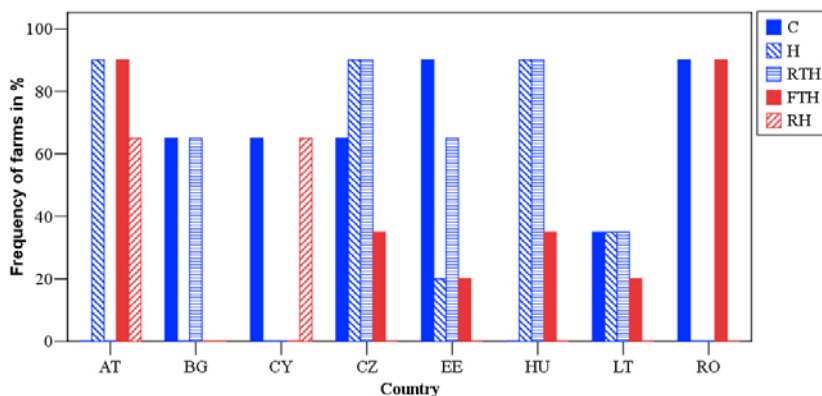


Figure 1: Machinery used for organic weed management on arable land

(N = 38 experts, legend: C-Cultivator; H-Hoes; RTH-rigid tine harrow; FTH-flex-tine harrow; RH-Rotary Hoe; country codes: AT-Austria, BG-Bulgaria, CY-Cyprus, CZ-Czech Republic, EE-Estonia, HU-Hungary, LV-Latvia, LT-Lithuania, RO-Romania)

Machinery commonly used for direct weed regulation on arable land

Major groups of machinery were categorised to allow the comparison of machinery from different countries. They were as follows: flex-tine harrow, rotary hoe, finger weeder, flame weeder, brush hoe, cultivator, hoe and rigid tine harrow. Experts gave

estimations on the countrywide distribution of the machinery using the terms „not common“, „common“ or „very common“. Figure 1 summarises the application of the different tools in each country. The choice of colour is related to two main groups of machinery: blue – non-typical “traditional” tools for weed management (cultivators, hoes, rigid tine harrows) and red – special “new” tools for weed control (flex tine harrows, finger weeder, rotary hoes,).

The availability of machinery is depending on the size of the farms. More different and modern tools were available on farms with more than 50 ha.

Importance of weed management

Weed management was considered as the main criterion for successful organic farming and as the main objective in the planning/choosing of most of the plant production measures by nearly all countries. Weed infestation is one of the main factors limiting crop yield levels in most of the new EU member states and candidate countries. The question of whether the whole cropping system or only single measures should be modified to improve weed management success depends greatly on the kind of production profile, the natural site conditions, and the available agro technological tools. It seemed that problems in cereal oriented production systems were easier to handle than in other systems.

Limiting factors for weed management success

National experts were asked to pass their subjective opinion on the most limiting factors for improving weed management success. Some pre-defined answer categories were provided to ensure comparability between the particular countries. The results of this question are summarised in Table 1.

Tab. 1: “What are the most important limitations on improving weed management success in organic farming in your country?”

(categories: 3 - yes, that’s totally right; 2 - yes, that’s partly true; 1 - non, that’s not the point; intermediate values - multiple differing answers, N = 38 experts, AT-Austria, BG-Bulgaria, CY-Cyprus, CZ-Czech Republic, DE- Germany, EE-Estonia, HU-Hungary, LV-Latvia, LT-Lithuania, PL-Poland, Ro-Romania, SK-Slovakia, SI-Slovenia)

| Limitations | AT | BG | CY | CZ | EE | DE | HU | LV | LT | PL | RO | SK | SI |
|-----------------------------------|-----|----|----|-----|----|-----|----|----|----|----|----|----|----|
| Specific natural conditions | 2-3 | 2 | 2 | 1-2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 3 | 2 |
| Economic costs | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 1 | 3 |
| Available machinery | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | 3 | 1 | 3 |
| Capital for investments | 1-2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 1 | 3 |
| Political / adm. frame conditions | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 2 | 1 | 1 |
| Education | 2 | 2 | 2 | 1-2 | 3 | 1-2 | 3 | 2 | 3 | 2 | 2 | 2 | 3 |

| Limitations | AT | BG | CY | CZ | EE | DE | HU | LV | LT | PL | RO | SK | SI |
|-----------------------|----|----|----|----|----|-----|----|----|----|----|----|----|----|
| Scientific background | 2 | 2 | 2 | 2 | 2 | 1-2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 |
| Advisory services | 2 | 0 | 2 | 2 | 3 | 1 | 3 | 2 | 3 | 1 | 2 | 3 | 2 |

Discussion

The CHANNEL project was targeted on the promotion of communication between experts, data collection and exchange of information. The findings of the current project should therefore not be regarded as the result of a statistical farm survey or a research subject.

Weed infestation was, in most of the new EU member states and candidate countries, one of the main factors limiting crop yield. Despite differences in farm size, historical background and other frame conditions, there is a small number of the same noxious weeds that occur in almost all countries. These were, on arable land, *Amaranthus sp.*, *Cirsium arvense* (L.) Scop., *Elymus repens* (L.) Gould., *Chenopodium album* L., *Galium aparine* L. and different chamomile species. The dominance of these weeds is neither restricted to the new EU member states nor to organic farming (Becker and Hurlle 1998, Salonen et al. 2001). However, the frequency of these weeds is some times higher on organic fields compared to conventional ones (Rydberg and Milberg 2000). The existing methods seem to be insufficient for the management of these species hitherto. Alien weed species are a considerable problem in organic farming throughout the participating countries. Monitoring of and research on control methods would be recommended. The most common machineries used, such as cultivator, hoe and rigid tine harrow, were typical for conventional farming and are not adapted to the specific needs of organic farming, e. g. for mechanical weed control in narrowly spaced crops or in crops with great crop height. As a recent trend, the use of the flex-tine harrow had spread in a number of these countries. Other modern machinery, such as the finger weeder, rotary hoe or flame weeder are not frequently used in the new member and candidate countries. Economic constraints (lack of available machinery, lack of capital and high economic costs) were stated as the main limitations of the improvement of weed management success. Education and advisory services were only partly regarded as limiting factors. Nevertheless, improvements in these sectors are needed in order for new practical methods to be developed.

Acknowledgment

This project was supported as a Specific Supported Action (SSA) by the EU FP 6, Priority 5. Food Quality and Safety, Contract No.: FOOD-CT-2004-003375.

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