THE ECONOMIC IMPACT OF WEEDS AND THEIR CONTROL IN TURKEY

Assist. Prof. Dr. Yakup Erdal ERTURK
Department of Agricultural Economics, Igdir University

Prof. Dr. Ilhan UREMIS
Department of Plant Protection, Mustafa Kemal University

Assoc. Prof. Dr. Ahmet ULUDAG
Department of Plant Protection, Igdir University
INTRODUCTION

Maize is an important crop with various uses from animal husbandry to industry. It is mainly a fodder crop with its 64% use worldwide. However, it is produced 45% for human consumption in Turkey, which is 19% only worldwide.
## It is produced all over Turkey

<table>
<thead>
<tr>
<th>Regions</th>
<th>Area Sown (ha)</th>
<th>Production (ton)</th>
<th>Yield (ton/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediterranean</td>
<td>197,867</td>
<td>1,681,714</td>
<td>8.50</td>
</tr>
<tr>
<td>Aegean</td>
<td>65,582</td>
<td>511,900</td>
<td>7.81</td>
</tr>
<tr>
<td>East Marmara</td>
<td>64,547</td>
<td>456,423</td>
<td>7.07</td>
</tr>
<tr>
<td>Southeast Anatolia</td>
<td>53,079</td>
<td>439,702</td>
<td>8.28</td>
</tr>
<tr>
<td>West Black Sea</td>
<td>64,726</td>
<td>179,028</td>
<td>2.77</td>
</tr>
<tr>
<td>East Black Sea</td>
<td>43,529</td>
<td>84,773</td>
<td>1.95</td>
</tr>
<tr>
<td>West Anatolia</td>
<td>11,671</td>
<td>76,665</td>
<td>6.57</td>
</tr>
<tr>
<td>West Marmara</td>
<td>10,150</td>
<td>68,190</td>
<td>6.72</td>
</tr>
<tr>
<td>Central East Anatolia</td>
<td>3,188</td>
<td>19,545</td>
<td>6.13</td>
</tr>
<tr>
<td>Central Anatolia</td>
<td>2,119</td>
<td>15,592</td>
<td>7.36</td>
</tr>
<tr>
<td>Northeast Anatolia</td>
<td>498</td>
<td>1,478</td>
<td>2.97</td>
</tr>
</tbody>
</table>
INTRODUCTION

Maize producing area in Turkey has been about 600 000 hectares since 1960s in spite of year by year fluctuations.

The area decreased in late 1980s but mainly it as ascended for last decade.
INTRODUCTION

Pests in Turkey in maize show similarity with common pests worldwide.

- Ostrinia nubilalis,
- Sesamia nonagrioides,
- Agrotis spp.,
- Helicoverpa armigera,
- Rhopalosiphum spp.,
- Spodoptera spp.,
- Tetranychus spp.,
- Mythimna spp. and
- Nezara viridula

Helminthosporium spp. and Fusarium spp. are the main disease agents in Turkey’s maize production.
INTRODUCTION

Weeds also cause crop losses in maize if they are not controlled.

Weeds could cause potentially 37% crop loss in the world production.

10% (5 to 17% depending on regions) actual crop loss worldwide assessed in spite of application of the weed control measures.
Due to climatic, geographic, and edaphic differences in maize producing areas of Turkey and varying cropping techniques, field sizes, and economical levels, for most weed species change region to region.

However, there are many common species.
In the Samsun province in the Black Sea Region, weed species reduced from 43 species in 1973 to 30 species in early 2000s (Mennan and Isik, 2003; Ozduman, 2005).

Sorghum halepense (L.) Pers. and Cynodon dactylon (L.) Pers. were among important species in 1973. No narrow leaf species except Alopecurus myosuroides Hudson was among important species in 2000s where Artemisia vulgaris L. and Convolvulus arvensis L. were the only important perennials.
WEED PROBLEM IN MAIZE IN TURKEY

In the inner part of the Black Sea Region (Kazova area), *Convolvulus arvensis* was the only perennial species among the top 10 common species (Kacan et al., 1997) while *Echinochloa crus-galli* (L.) P. Beauv., *Setaria* spp. and *Digitaria sanguinalis* (L.) Scop. were the narrow leaf species.
In the Cukurova plain in the Mediterranean Region of Turkey, 18 species were mentioned as the most common and dense species (in the alphabetical order): Amaranthus albus L., A. retroflexus, A. viridis L., Chrozophora tinctoria (L.) Rafin., Convolvulus arvensis L., Cyperus rotundus L., Echinochloa colonum (L.) Link, E. crus-galli, Euphorbia chamaesyce L., Hibiscus trionum L., Paspalum paspalodes (Michx.) Schrib., Physalis alkekengi L., Portulaca oleracea L., Prosopis farcta (Banks and Sol.) Macbride, Setaria viridis L., Solanum nigrum L., Sorghum halepense, Xanthium strumarium L. (Orel, 1996).

- Other studies in this region gave the same species with different importance orders (Gonen, 1999; Oksar, 2000).
- Also, similar results in maize growing areas were found in Aydin province in the Aegean Region (Dogan and Boz, 2005).
The second crop maize consists 26% of the total maize production of Turkey (Dagdelen and Gurbuz, 2008).

Farmers’ view for the most problematic species, for the both cropping types, was similar for two types of productions in the Cukurova Region. 

*Echinochloa* spp., *Amaranthus* spp., *Sorghum halepense*, *Setaria* spp. and *Portulaca oleracea* were the top five problematic species in the main crop maize while *Setaria* spp., *Xanthium strumarium*, *Echinochloa* spp., *Amaranthus* spp., and *Sorghum halepense* in the second crop maize in the order of magnitude by farmers (Gungor, 2005).
WEED PROBLEM IN MAIZE IN TURKEY

If weeds were left during entire season, studies with natural weed stands, which were mainly common weeds of the regions of Turkey, showed that maize yield can be reduced 34-65% depending on year in the main crop corn in the Aegean Region and 49% in the second crop maize.
Depending on critical period studies, preemergence (PRE) or presowing herbicides would be preferred to avoid higher yield losses.

However, a postemergence (POST) herbicide can be applied in the second week after crop sowing, and the field should be kept weed free for 4 or 5 weeks if a farmer can tolerate 10% yield loss.
Hand hoeing, interrow tillage and herbicide applications are the common weed control methods in maize production.

Some farmers apply interrow tillage twice.

Hand hoeing is common practice of small farmers.

In addition, earthen can be considered a weed control method although weeding is not the main aim (Uremis, 1993)
## COST OF WEED CONTROL

Table 4. Calculation of weed control costs in maize

<table>
<thead>
<tr>
<th>Cost Components</th>
<th>Diesel Consumption (l/ha)</th>
<th>Cost (€/ha)*</th>
<th>Part of Cost for Weed control (€/ha)</th>
<th>Labor and Herbicide (€/ha)</th>
<th>Total Cost (€/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plowing</td>
<td>30</td>
<td>82.8</td>
<td>23.5</td>
<td></td>
<td>23.5</td>
</tr>
<tr>
<td>Tillage</td>
<td>30</td>
<td>82.8</td>
<td>23.5</td>
<td></td>
<td>23.5</td>
</tr>
<tr>
<td>Interrow tillage (3 times)</td>
<td>10</td>
<td>82.8</td>
<td>47.0</td>
<td></td>
<td>47.0</td>
</tr>
<tr>
<td>Preparing irrigation ditches</td>
<td>10</td>
<td>15.7</td>
<td>7.8</td>
<td></td>
<td>7.8</td>
</tr>
<tr>
<td>Earthing up</td>
<td>10</td>
<td>15.7</td>
<td>7.8</td>
<td></td>
<td>7.8</td>
</tr>
<tr>
<td>Herbicide</td>
<td>10</td>
<td>15.7</td>
<td>15.7</td>
<td>25.3</td>
<td>41.0</td>
</tr>
<tr>
<td>Smooth roller</td>
<td>10</td>
<td>15.7</td>
<td>7.8</td>
<td></td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>0.0</td>
<td>2.2</td>
<td></td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td><strong>160.7</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
COST OF WEED CONTROL

Regarding to those data and observations, we might say one third of maize farmers spent 160.7 € for weed control.

It can be assumed the remaining might spend 205.2 TL per hectare for weed control excluding herbicide costs and reducing interrow tillage costs.

The area sown in 2011 was 589,000 ha. Using above assumptions, the cost of weed control in maize in Turkey in 2011 was roughly 66 million €.
Regarding to crop loss data from Dogan et al. (2004) and Uremis et al. (2009), weeds without any control measure can reduce maize yield from 34 to 65% depending on year.
COST OF WEED CONTROL

We might assume 50% maize crop loss as average.

It means 2.1 million ton maize was gained applying weed control techniques, which the maize production of Turkey was 4.2 millions tons in Turkey in 2011.
The monetary value of saved crop for 2011 was assessed 570 million € (average price of maize was 0.27€=0.63 TL per kg), which means over 500 million € return was obtained by farmers.

However, average 10% loss is still occurs under weed control measures worldwide (Oerke and Dehne, 2004).

It means, probably under ideal weed control measurements, it would have saved another 500 000 tons maize, roughly
Thank you for attentions