On-Farm Irrigation Systems in Italy
Overview paper
Graziano Ghinassi
graziano.ghinassi@unifi.it

ITAL-ICID
Italian National Committee of International Commission on Irrigation and Drainage

WG-SON-FARM meeting, September 4, 2019
Bali, Indonesia

Content
1. Italy in the Eu
2. Water and irrigation
3. Irrigation efficiency at the field level
4. Management and technology to improve system performance

National territory

Divided into 20 Regions, which are public authorities with their own statutes

Country area: 302,073 km² (117,053 mi²)
Population: 60,359,546 (December 31, 2018)
Founder Member of the European Union (March 25, 1957)

EU directives on Rural Development concern also the use of irrigation water at the field level (e.g., to improve water and energy efficiency)

After Spain, Italy is the European Country with the largest irrigated area.

IRRIGATED LAND IN THE EU COUNTRIES (2016)
% of cultivated area

1. Italy in the Eu
2. Water and irrigation
3. Irrigation efficiency at the field level
4. Management and technology to improve system performance
1. Italy in the EU
2. Water and irrigation
3. Irrigation efficiency at the field level
4. Management and technology to improve system performance

WATER RESOURCES IN ITALY (2006)

Gross precipitation (P)
Reference Evapotranspiration (ETo)
Effective precipitation (Pe)
Effective infiltration (Ie)

Farms >700,000
Irrigated farms ~500,000
Cultivated land: 125,764 km² (41.8% the Italian territory)
Irrigable land: 41,230 km²
Irrigated land (2016): 25,530 km² (20.2% the national cultivated land)
Compared to 1982: irrigated land increased by 1.7%, farms number decreased by 20.9% (e.g., larger farms)
Compared to 2012: irrigated land increased by 5.5%

About 50% of withdrawn water is allocated to agriculture (2016)
According to the 6th General Census of Agriculture (2012), water used in agriculture amounts to 11.6 billion m³/yr

Water use increases with the irrigated area: from 3,000 m³/ha for small farms (<1 ha irrigated) to more than 7,000 m³/ha for large farms (>100 ha irrigated)
3,500 m³/ha when ground water is used
4,300 m³/ha when internal surface water is used
5,000 m³/ha when external surface water is used
4,500 m³/ha under on turn delivery system
6,000 m³/ha under on demand delivery system
3,000 m³/ha supplied by micro irrigation systems
3,500 m³/ha supplied by sprinkler systems
5,500 m³/ha supplied by traditional (border, furrow) systems
15,000 m³/ha supplied by basin

Where irrigation is supported by advisory services, water saving is >10%
Applied irrigation water (m³/ha) – Average by Region

Efficiency assessment at the field level

<table>
<thead>
<tr>
<th>System category</th>
<th>Crop Type*</th>
<th>Assessment criterion</th>
<th>Range (%)</th>
<th>Avg (%)</th>
<th>Publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro A, P</td>
<td>Uniformity</td>
<td>44-87</td>
<td>62.7</td>
<td>2006, ARSIA</td>
<td></td>
</tr>
<tr>
<td>Micro A</td>
<td>Uniformity</td>
<td>50-60</td>
<td>75.7</td>
<td>2012, ICID</td>
<td></td>
</tr>
<tr>
<td>Micro P</td>
<td>Uniformity</td>
<td>40-53</td>
<td>74.5</td>
<td>2012, ICID</td>
<td></td>
</tr>
<tr>
<td>Sprinkler A, P</td>
<td>Uniformity</td>
<td>35-71</td>
<td>58.1</td>
<td>2009, AIA</td>
<td></td>
</tr>
<tr>
<td>Sprinkler A</td>
<td>Balance</td>
<td>59-68</td>
<td>78.4</td>
<td>2012, IIT</td>
<td></td>
</tr>
<tr>
<td>Micro A</td>
<td>Balance</td>
<td>39-61</td>
<td>63.2</td>
<td>2012, IIT</td>
<td></td>
</tr>
</tbody>
</table>

A=Annual
P=Perennial

Advisory services to support on-farm irrigation

- **IRRINET**: Irrigation Advisory Services for Farm Water Management based on water balance. Information supplied to farmers by Consortia (WUAs), the manager of the Service.
- **IRRISAT**: Irrigation Advisory Service based on satellite data. It is for:
  - Farm business and water suppliers and anyone which needs customized weather forecasts and irrigation maps, crop growth evaluations and distinguish between irrigated and non-irrigated fields.
  - Water supplier managers, Water Authorities and who needs information about crop growth, irrigation requirements and distinguish between irrigated and non-irrigated fields.

IRRIGATION ADVISORY SERVICES FOR FARM WATER MANAGEMENT SERVICE IS BASED ON A WATER BALANCE MODEL AIMED AT CROP IRRIGATION MANAGEMENT AT A FIELD SCALE AND THEREFORE THE PROCESSES AND CALCULATION SIMULATED BY THE MODEL REFLECT SUCH AIM. THE MODEL HAS A STRUCTURE THAT IS CONCERNED WITH THE SOIL-PLANT-ATMOSPHERE CONTINUUM. IT INCLUDES THE SOIL, WITH ITS WATER BALANCE; THE PLANT, WITH ITS DEVELOPMENT, GROWTH; AND THE ATMOSPHERE, WITH ITS THERMAL REGIME, RAINFOREST AND ENVIRONMENTAL DEMAND.

1. Italy in the Eu
2. Water and irrigation
3. Irrigation efficiency at the field level
4. Management and technology to improve system performance
Irrisat by Ariespace

The platform is based on a technological innovation that combines satellite observations, at high spatial and temporal resolution, and weather forecasts. Irrisat provides daily irrigation maps with a forecast horizon of 5 days from the last irrigation, using innovative computation methods. Additionally, it helps in the analysis of crop and weather data (evapotranspiration, irrigation, rain, temperature, vegetation index), through a simple and intuitive interface. Both for individual farmers and WUAs.

Source: https://www.irrisat.com/en/farmer/
Conclusions

➢ Italy implements EU directives concerning irrigation. General aim is to improve the performance of agricultural systems

➢ Irrigation equipment is being modernized in the frame of the new orientation aiming to water saving and GHG emissions reduction

➢ Compared to the 6th General Census of Agriculture, the percentage of land irrigated by pressurized systems is increasing

➢ Compared to a decade ago, activity of Irrigation Advisory Services for Farm Water Management has spread over larger areas in the Country

➢ At the farm level, the conditions exist (e.g., advanced technology and management) for a significant improvement in resource use efficiency, environment protection and farm income