Water Saving Irrigation by Bauer Group and Smart Control Systems

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Sales Director Asia, Australia and New Zealand
Bauer Group

10 years with Bauer
Selling Wastewater and Irrigation equipment
Agricultural Background
University degree in business administration
BAUERS CLOSED BIOLOGICAL CYCLE CONCEPT

- 68% of worldwide water use is used for agriculture
- High responsibility for using efficient ways of irrigation
BAUER Equipment – slurry into valuable fertilizer and efficient irrigation

Using the liquid slurry by distributing into soil or close to bottom of soil.

Distributing by tanker or irrigation equipment.

Slurry processing for the recovery of precious nutrients
Homogenize – Separate – Extract – Distribute
Existing irrigation methods

Non pressurized
- Flood irrigation
- Furrow irrigation

Pressurized
- Sprinkler irrigation
- Drip irrigation
- Microsprinkler irrigation

- Classic sprinkler irrigation
  - Hose pull
  - Pipe grid
  - Solid – Set

- Pivot systems
- Hose reels
Efficiency of the irrigation methods

Non pressurized
- Flood irrigation
- Furrow irrigation

Pressurized
- Sprinkler irrigation
- Drip irrigation
- Microsprinkler irrigation

- Classic sprinkler
- Hose pull
- Pipe grid
- Solid – Set

- Movable
- Semi-Fixed

- Pivot systems
- Hose reels

40-50% 65-75% 85-95% 70-85%
Irrigation. What does my irrigation rate mean?

Amount of water:
1 mm = 1 litres/m² = 10 m³/ha

Time:
1 day = 24 hours

Irrigation rate:
Amount of water / Time, i.e. \( \text{mm/day} \)
Irrigation. Basics to plan an irrigation project

1. Water source
2. Plot characteristics
3. Crops
4. Budget (Investment + Running costs)

IRRIGATION EQUIPMENT
Irrigation. Basics to plan an irrigation project

1. Water source

- Where does the water come from?
  - Origin (river, lake, borehole, reservoir, etc)
  - How far is it?
  - Height difference

- How many hours per day is the water available?

- How is the water quality?
  - With salt, with sand, with organic particles?

- Do I have enough water for my crops?
Irrigation. Basics to plan an irrigation project

1. Water source
   • Do I have enough water for my crops?

   If crop water needs are 6 mm/day and my plot has 60 ha, I need a water source providing me...

   \[
   6 \text{ mm/day} = 60 \text{ m}^3/\text{ha}
   \]

   if I have 60 ha, I need 60 \times 60 = 3600 \text{ m}^3/\text{day} of water

   If my source provides me water 24h/day, then I will need to pump up at least...

   \[
   \frac{3600 \text{ m}^3}{24h} = 150 \text{ m}^3/h
   \]

   But if I have 600 ha, I need 1500 \text{ m}^3/h!!!
Irrigation. Basics to plan an irrigation project

2. Plot characteristics

- Shape
- Type of soil
- Location
- Type of climate

<table>
<thead>
<tr>
<th>Climatic zone</th>
<th>Crop water needs according to mean daily temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>low</td>
</tr>
<tr>
<td>Desert/arid</td>
<td>4-6</td>
</tr>
<tr>
<td>Semi arid</td>
<td>4-5</td>
</tr>
<tr>
<td>Sub-humid</td>
<td>3-4</td>
</tr>
<tr>
<td>Humid</td>
<td>1-2</td>
</tr>
</tbody>
</table>

*for standard grass

<table>
<thead>
<tr>
<th>Climatic Factor</th>
<th>Crop water need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunshine</td>
<td>sunny (no clouds)</td>
</tr>
<tr>
<td>Temperature</td>
<td>hot</td>
</tr>
<tr>
<td>Humidity</td>
<td>low (dry)</td>
</tr>
<tr>
<td>Windspeed</td>
<td>windy</td>
</tr>
</tbody>
</table>
Irrigation. Which system do I choose?
Irrigation. Basics to plan an irrigation project

2. Plot characteristics

• Shape

   - Centerstar
   - Linestar
   - Rainstar
3. Type of crops

- Daily water needs of a fully grown crop
- Duration of the total growing season
- Growth stage

Seasonal/Daily water need
Irrigation. Basics to plan an irrigation project

3. Type of crops

<table>
<thead>
<tr>
<th>Crop</th>
<th>Total growing period (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>100-365</td>
</tr>
<tr>
<td>Banana</td>
<td>300-365</td>
</tr>
<tr>
<td>Barley/Oats/Wheat</td>
<td>120-150</td>
</tr>
<tr>
<td>Bean green</td>
<td>75-90</td>
</tr>
<tr>
<td>Bean dry</td>
<td>95-110</td>
</tr>
<tr>
<td>Cabbage</td>
<td>120-140</td>
</tr>
<tr>
<td>Carrot</td>
<td>100-150</td>
</tr>
<tr>
<td>Citrus</td>
<td>240-365</td>
</tr>
<tr>
<td>Cotton</td>
<td>180-195</td>
</tr>
<tr>
<td>Cucumber</td>
<td>105-130</td>
</tr>
<tr>
<td>Eggplant</td>
<td>130-140</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crop</th>
<th>Crop water need (mm/total growing period)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>600-1000</td>
</tr>
<tr>
<td>Banana</td>
<td>1200-2200</td>
</tr>
<tr>
<td>Barley/Oats/Wheat</td>
<td>450-650</td>
</tr>
<tr>
<td>Bean</td>
<td>300-500</td>
</tr>
<tr>
<td>Cabbage</td>
<td>350-500</td>
</tr>
<tr>
<td>Citrus</td>
<td>900-1200</td>
</tr>
<tr>
<td>Cotton</td>
<td>700-1300</td>
</tr>
<tr>
<td>Maize</td>
<td>500-800</td>
</tr>
<tr>
<td>Melon</td>
<td>400-600</td>
</tr>
<tr>
<td>Onion</td>
<td>350-550</td>
</tr>
<tr>
<td>Peanut</td>
<td>500-700</td>
</tr>
<tr>
<td>Pea</td>
<td>350-500</td>
</tr>
<tr>
<td>Pepper</td>
<td>600-900</td>
</tr>
<tr>
<td>Potato</td>
<td>500-700</td>
</tr>
<tr>
<td>Rice (paddy)</td>
<td>450-700</td>
</tr>
<tr>
<td>Sorghum/Millet</td>
<td>450-650</td>
</tr>
<tr>
<td>Soybean</td>
<td>450-700</td>
</tr>
<tr>
<td>Sugarbeet</td>
<td>550-750</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>1500-2500</td>
</tr>
<tr>
<td>Sunflower</td>
<td>600-1000</td>
</tr>
<tr>
<td>Tomato</td>
<td>400-800</td>
</tr>
</tbody>
</table>
Irrigation. Basics to plan an irrigation project

4. Budget

- Investment cost per area (€/ha)

Running costs:
- Pump station
- Required inlet pressure
- Handling

Fuel & Electricity
Manpower
Irrigation with Bauer Rainstar or Pivot – your insurance to secure the harvest and optimize yields
Central pivots are in general the most suitable irrigation system for squared shaped plots from 20 ha onwards. Why?

- High water efficiency & application uniformity
- Low personal and maintenance costs
- Low needs for soil preparation
- No contribution to soil salinity
- Multiple crop versatility
- Easy adjustment of precipitation rate
- Possibility of precise application of crop inputs
- Optimum costs of investment
- Low energy consumption
Central pivots.

High versatility

• Suitable for a great variety of crops
• Possibility to have different precipitation rates along irrigated area
• Ability to hedge against weather and rain shortages
• Crop inputs can easily be dosed and timely applied (= reduction of inputs consumption + good nutrient management + crop production boost)
• Can work on sloped terrains up to 15%
Central pivots: BAUER Centerstar

Performance table
Centerstar 168 EL

<table>
<thead>
<tr>
<th>Irrigation capacity</th>
<th>Cycle time</th>
<th>Speed</th>
<th>Timer</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.59 mm</td>
<td>18 h 21 min</td>
<td>154 m/h</td>
<td>100 %</td>
</tr>
<tr>
<td>6 mm</td>
<td>24 h</td>
<td>118 m/h</td>
<td>76 %</td>
</tr>
<tr>
<td>7 mm</td>
<td>27 h 59 min</td>
<td>101 m/h</td>
<td>66 %</td>
</tr>
<tr>
<td>8 mm</td>
<td>31 h 59 min</td>
<td>93.3 m/h</td>
<td>57 %</td>
</tr>
<tr>
<td>9 mm</td>
<td>36 h</td>
<td>78.4 m/h</td>
<td>51 %</td>
</tr>
<tr>
<td>10 mm</td>
<td>40 h</td>
<td>70.6 m/h</td>
<td>48 %</td>
</tr>
<tr>
<td>15 mm</td>
<td>59 h 59 min</td>
<td>47.1 m/h</td>
<td>31 %</td>
</tr>
<tr>
<td>20 mm</td>
<td>80 h</td>
<td>35.3 m/h</td>
<td>23 %</td>
</tr>
<tr>
<td>25 mm</td>
<td>100 h</td>
<td>28.2 m/h</td>
<td>18 %</td>
</tr>
<tr>
<td>30 mm</td>
<td>119 h 59 min</td>
<td>23.8 m/h</td>
<td>15 %</td>
</tr>
<tr>
<td>36 mm</td>
<td>139 h 59 min</td>
<td>20.2 m/h</td>
<td>13 %</td>
</tr>
</tbody>
</table>
**Cabinet**

- 4,5” or 10” touch display
- Main switch
- Safety switch
- Switch for manual operation
- Switch for the direction
BAUER VRI

- Complete solution for Pivot
- Complete solution for Corner
- System from a single source
  - Variable
  - exact
  - Easy to use
- Integrated to SmartRain
- For PC and Smartphone
  - Apple IOS
  - Android
Hardware Components

SmartTouch CP 100

VRI Control Box

Solenoid Valve
Concept Overview

SmartRain
Software Components

- The software provides full internet access to any connected Bauer Irrigator
- SmartRain offers:
  - Live connection to each machine
  - Easy creation of programs
  - Easy creation of VRI zones
  - Easy Analysis of system data
  - Watering status updates
  - Import of field data
Satellite data for agriculture - Variable RAIN

Irrigation Maps = Plant Growth Model + Satellite Date
Irrigation Recommendation once a week

Variable Rain

- Worldwide irrigation recommendations
- Our offer:
  - Reduction of irrigation amount on field level
  - Section wise
  - Variable Rate Irrigation

The unique combination of plant growth model and satellite data enables us to provide highly accurate irrigation recommendations.
Variable Rain

Variable Rate Irrigation (VRI)
Satellite-based site specific irrigation for Center Pivots made easy.

Control and monitor your irrigation from your smartphone or computer with Variable Rain and receive field and crop specific irrigation recommendations.

Optimize your water consumption for following crops:
Maize, sugar beet, canola, winter wheat, barley

Advantages:

- Appropriate irrigation in a 10x10 m grid or individual sectors
- No need to define irrigation zones manually
- Avoidance of waterlogging
- Avoidance of nutrient leaching and surface water run-off
- Systematically turn off over streets and water bodies

Higher success due to:

- Saving of water
- Saving of Energy
- Saving of Timer
- Exploitation of yield potential
Variable Rate Irrigation with VariableRain:
spatial variation of crop water demand based on satellite data

Standard irrigation
constant: 8.00 mm/d

Sample values of VRI
recommendation:

Dense crop: 7.00 mm/d
Medium crop: 6.25 mm/d

⇒ Significant reduction!
⇒ Water savings of 1000 m³ to 1750 m³ possible only for one pivot and one day of irrigation
Why BAUER: Smart agriculture!
Why BAUER: SmartRain app

Supervision and control of all your irrigation devices and pump stations with the GPS-supported App SmartRain
Why BAUER: How is SmartRain constructed

**GPS-Transmitter**
Solar energy driven, directly on the central tower

**Internet Platform**
Access to SmartRain through any PC or Tablet with Internet connection

**Connection**

**App**
Selected features from the Smartphone

**Satellite Data or soil moisture devices and weather stations**
Why BAUER: Supervision of the irrigation devices

- The irrigation device is ready in 35 minutes.
- Plot change can be organized
- The irrigation device stopped 5 hours ago
- The irrigation device is ready!
- You have to irrigate soon this plot! (last irrigation strip)
- Updated information about the field and irrigation devices on a mouse click!
- The irrigation device is ready in 35 minutes. Plot change can be organized

BAUER FOR A GREEN WORLD
Why BAUER: SmartRain main features

- Alarm in case of incidents
  - Incident indication per SMS
- Control of movable devices
  - Directly through Smartphone or Tablet
- Management of teams
  - Administration of teams or staff
- Automatic analysis
  - Reports about water and soil conditions only pressing a button!
Why BAUER: Control of pumping stations
Why BAUER Company

Bauer advantages

• Consolidated Austrian company existing since 1930
• Top product quality according to highly demanding European standards
• Large experience in international markets
• Rich network of international experts, salesmen and dealers
• Customer accompaniment and along the whole project
• High degree of customer satisfaction
• Long product lifespan and ideal for rough conditions.
We make soil fertile!