Drip irrigation on cotton

Increased yield with less water
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Proper crop water relations are essential in optimising cotton growth, development and yield.

Drip irrigation allows scheduling and delivering irrigation water to meet the demand of the crop on a daily basis. This allows to optimize plant growth while avoiding water stress that could negatively affect the yield.

When compared to traditional methods of cotton irrigation, such as flood or furrow, drip irrigation can enhance water-use efficiency thus proving significant savings for the farm and above all for the environment.

Therefore drip irrigation represents an important production element not only to maximise the yield but also to efficiently manage the farm’s resources, such as water, energy, fertilizer and labour thus assuring the profit of the farm.

THE GREAT ADVANTAGES OF DRIP IRRIGATION

The most efficient and effective method of irrigating cotton is definitely drip irrigation whose main advantages are:

Yield
- Increased productivity per hectare cultivated compared to traditional inefficient irrigation methods, furrow or flood (owing to the uniform distribution of water and fertilizer);
- Significant high amount of fibre per unit of water applied; this because the increased productivity is achieved with dramatically reduced application of water (and fertilizer);
- Possibility of increasing the cultivatable surface in areas where the water resource is scarce.

Efficiency and environmental impact
- High irrigation efficiency (all the water is directly supplied to the roots of the plants reducing loss by evaporation to a minimum);
- Significant water saving compared to traditional irrigation methods;
- Extraordinary emission uniformity and consequently crop uniformity;
- Possibility of irrigating with extraordinary uniformity even surfaces with irregular perimeters, rounded corners or in proximity of roads or houses;
- Deficit irrigation practices can save even more water (and hence energy) still assuring same yield;
- Possibility to identify water management strategies that conserve and protect water resources within semiarid environments.

Fertigation
- Accurate and uniform application of fertilizer with a considerable saving (optimisation of the fertilizer dosage in relation to the plant development cycle) and reduced environmental impact;
- Possibility of intervening in case of micro/macro element deficiencies;
System management
• Possibility of irrigating at any time of day without any restriction;
• Ease of irrigation system management and overall farm management;
• Improved ease of field access;

Healthy plants for quality production
• Possibility to exactly schedule irrigations pre and post-bloom thus meeting the cotton water demand throughout its entire development cycle;
• Improved quality of fibre;
• Defence against water stress;
• Reduction of fungal diseases encouraged by water stagnation;
• Efficient delivery of herbicides and pesticides to successfully fight against weeds and insects.

OUR EXPERIENCE, OUR SOLUTIONS
Toro has successfully realised drip irrigation systems for cotton all over the world. After conducting numerous experimental campaigns Toro offers farmers two innovative solutions for cotton drip irrigation:

Aqua-Traxx PBX: this is the Toro drip tape that assures the best performance on the market, excellent emission uniformity and extraordinary quality;

Neptune: this is the drip line with flat emitter that gives good value for money at the same time guaranteeing high quality and excellent performance.

SUB-SURFACE DRIP IRRIGATION (SDI)
Where possible, a Sub-surface Drip Irrigation system will provide the farmer with these additional advantages:

• A further increase in irrigation efficiency thanks to the reduced loss by evaporation;
• A further increase in yield when adopting oxygation system (air injection into irrigation water allows to deliver oxygen directly to plant’s roots);
• Less weed growth and hence an additional great saving in weedkiller;
• Possibility of reusing the system for several seasons (no annual laying and installation costs, and disposal costs only at the end of its operating life);
• Easy crop rotation. In case of diseases, crop rotation is a must. The flexibility of SDI system allows irrigating cotton, alfalfa, corn and many other crops.

It is worth to mention that tillage has no impact on cotton yields. On the contrary switching to reduced or no tillage systems generates greater net returns mainly due to the reduced labour and inputs costs.
Toro offers a wide range of solutions to satisfy the most varied and stringent farming needs and requirements; to name only a few:

SANDY LOAM SOIL WITH ROWS OF MEDIUM LENGTH

In loose soil the force of gravity predominates with respect to the horizontal water movement and you should therefore opt for drip irrigation systems with short spacing between the drippers.

In all these conditions, Aqua-Traxx PBX is the best choice and is available with:

- 10, 15, 20 and 30 cm spacing;
- 5, 6, 7, 8, 10, 12, 15 mil wall thickness;
- 16 mm (5/8”) and 22 mm (7/8”) diameters;
- 6 flow rates: 0.30 / 0.38 / 0.42 / 0.57 / 0.64 / 0.87 l/h @ 0.7 bar.

Aqua-Traxx PBX is also available in other models. Ask for more information.
SURFACES WITH VERY LONG ROWS
(irrespective of the type of soil)

Where you have long rows and want to reduce the number of irrigation sectors to a minimum simplifying field management without compromising crop uniformity, Aqua-Traxx PBX is the right solution. Thanks to the innovative emitters with an ultra-low flow rate (the only ones on the market!), Aqua-Traxx PBX can reach considerable lengths guaranteeing an extraordinary emission uniformity:

- 3 ultra-low flow rates:
  - 0.30 l/h @ 0.7 bar - *Already successfully used!*
  - 0.38 l/h @ 0.7 bar - *Already successfully used!*
  - 0.42 l/h @ 0.7 bar - *Already successfully used!*

With Aqua-Traxx PBX, 22 mm diameter, 0.30 l/h flow rate, 40 cm spacing you can carry the water for more than 800 metres with 90% uniformity!

Aqua-Traxx PBX is also available in other models. Ask for more information.

**Model** | **Individual Emitter Flow Rate** | **Emitter Spacing** | **Emission Uniformity** | **Maximum Lateral Lengths in meters**
--- | --- | --- | --- | ---
RA5xx0825-yyy | 0.42 l/h | 20 cm | 90% | 241 @ 0.5 bar, 242 @ 0.6 bar, 243 @ 0.7 bar, 244 @ 0.8 bar, 245 @ 0.9 bar, 246 @ 1.0 bar
RA5xx1613-yyy | 0.42 l/h | 40 cm | 90% | 304 @ 0.5 bar, 305 @ 0.6 bar, 306 @ 0.7 bar, 308 @ 0.8 bar, 309 @ 0.9 bar, 310 @ 1.0 bar
RA5xx0822-yyy | 0.38 l/h | 20 cm | 90% | 258 @ 0.5 bar, 259 @ 0.6 bar, 260 @ 0.7 bar, 261 @ 0.8 bar, 262 @ 0.9 bar, 263 @ 1.0 bar
RA5xx1611-yyy | 0.38 l/h | 40 cm | 90% | 400 @ 0.5 bar, 401 @ 0.6 bar, 402 @ 0.7 bar, 405 @ 0.8 bar, 406 @ 0.9 bar, 408 @ 1.0 bar
RA5xx0817-yyy | 0.30 l/h | 20 cm | 90% | 304 @ 0.5 bar, 305 @ 0.6 bar, 306 @ 0.7 bar, 308 @ 0.8 bar, 309 @ 0.9 bar, 310 @ 1.0 bar
RA5xx1608-yyy | 0.30 l/h | 40 cm | 90% | 470 @ 0.5 bar, 472 @ 0.6 bar, 474 @ 0.7 bar, 476 @ 0.8 bar, 477 @ 0.9 bar, 479 @ 1.0 bar

Max pressure: 0.7 bar for 5 mil / 0.8 bar for 6 mil / 0.9 bar for 7 mil

**Model** | **Individual Emitter Flow Rate** | **Emitter Spacing** | **Emission Uniformity** | **Maximum Lateral Lengths in meters**
--- | --- | --- | --- | ---
RA7xx0825-yyy | 0.42 l/h | 20 cm | 90% | 426 @ 0.5 bar, 428 @ 0.6 bar, 431 @ 0.7 bar, 433 @ 0.8 bar, 434 @ 0.9 bar, 435 @ 1.0 bar
RA7xx1613-yyy | 0.42 l/h | 40 cm | 90% | 664 @ 0.5 bar, 667 @ 0.6 bar, 670 @ 0.7 bar, 672 @ 0.8 bar, 674 @ 0.9 bar, 676 @ 1.0 bar
RA7xx0822-yyy | 0.38 l/h | 20 cm | 90% | 457 @ 0.5 bar, 459 @ 0.6 bar, 461 @ 0.7 bar, 462 @ 0.8 bar, 463 @ 0.9 bar, 465 @ 1.0 bar
RA7xx1611-yyy | 0.38 l/h | 40 cm | 90% | 706 @ 0.5 bar, 713 @ 0.6 bar, 717 @ 0.7 bar, 719 @ 0.8 bar, 721 @ 0.9 bar, 723 @ 1.0 bar
RA7xx0817-yyy | 0.30 l/h | 20 cm | 90% | 536 @ 0.5 bar, 539 @ 0.6 bar, 541 @ 0.7 bar, 543 @ 0.8 bar, 544 @ 0.9 bar, 546 @ 1.0 bar
RA7xx1608-yyy | 0.30 l/h | 40 cm | 90% | 833 @ 0.5 bar, 837 @ 0.6 bar, 840 @ 0.7 bar, 843 @ 0.8 bar, 847 @ 0.9 bar, 849 @ 1.0 bar

Max pressure: 0.7 bar for 7 mil / 0.8 bar for 8 mil
CLAYEY LOAM SOIL WITH ROWS OF MEDIUM LENGTH

Heavy soil is characterised by good horizontal water movement and you should therefore opt for drip lines with longer spacing.

Neptune is the solution that most efficiently satisfies these requirements:
- 40, 50 and 60 cm spacing;
- 8, 10, 12, 15, 18, 20, 24, 30 mil wall thickness;
- 16 mm (5/8”) and 22 mm (7/8”) diameters;
- 4 flow rates: 0.67 / 1.08 / 1.30 / 1.99 l/h @ 0.7 bar.

### CLAYEY LOAM SOIL WITH ROWS OF MEDIUM LENGTH

#### Diameter 16 mm (5/8”)

<table>
<thead>
<tr>
<th>Model</th>
<th>Individual Emitter Flow Rate</th>
<th>Emitter Spacing</th>
<th>Emission Uniformity</th>
<th>Maximum Lateral Lengths in meters</th>
<th>@ 0.7 bar</th>
<th>@ 0.8 bar</th>
<th>@ 0.9 bar</th>
<th>@ 1.0 bar</th>
<th>@ 1.5 bar*</th>
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Max pressure: 0.8 bar for 6 mil
* Max pressure for thickness equal or greater than 18 mil

#### Diameter 22 mm (7/8”)

<table>
<thead>
<tr>
<th>Model</th>
<th>Individual Emitter Flow Rate</th>
<th>Emitter Spacing</th>
<th>Emission Uniformity</th>
<th>Maximum Lateral Lengths in meters</th>
<th>@ 0.7 bar</th>
<th>@ 0.8 bar</th>
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Max pressure: 0.8 bar per 8 mil
* Max pressure for thickness equal or greater than 18 mil

Neptune is also available with other emitters and different spacing. Ask for more information.
You wouldn’t think of any other way now!

TESTIMONIAL

“I can get 1.68 metric tons of cotton per hectare with 406 mm of drip water, but only 1.26 metric tons per hectare with 406 mm of pivot water. This means that I can get the same number of bales of cotton from 32 hectares of drip as I can get from 48 hectares of pivots. Why farm more acres for the same result? Yield, and crop per drop, is the bottom line.”

MEDIUM-HEAVY WALL DRIP-LINES

Medium-heavy wall drip lines (wall thickness from 15 to 30 mil) are characterised by better resistance and higher durability. Neptune, available in a wide range of wall thicknesses, is the best solution in these conditions:

- Reuse: the higher resistance of the wall allows a safe withdrawal and re-installation for several seasons;
- Rocky soil: reduction of damages caused by stones (especially in case of reuse);
- Multi-year crops: higher reliability due to greater resistance of the wall. The slightly larger investment can be shortly recouped;
- Soil infested with insects: reduction of the damages caused by insects;
- Pressure fluctuations: greater resistance to pressure fluctuations due to undulating terrain (where it is possible to accept lower emission uniformity).