TORO®

Strawberries Drip Irrigation

High Yields with
Organoleptic Properties.

strawberry

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The good commercial trend of strawberries continues to attract investments.
Strawberry cultivation is able to guarantee high revenue per cultivated area but at the same time it is a very "sensitive" crop, for which it is better to adopt the most innovative agronomic practices.
The current cultivation techniques allow the strawberry to be successfully grown in open field, protected environment or hydroponic and in many different climatic conditions.
The various growing techniques and the different varieties allow the production to be extended throughout the entire course of the year. Despite this wide adaptability, only the right irrigation management will ensure excellent results both in terms of quantity and quality.
The adoption of a drip system and the right scheduling of the irrigation are fundamental to achieve high production with good aesthetic and organoleptic qualities.

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STRAWBERRIES IN SOIL

If you grow the strawberry in soil (in open field or in a protected environment), it is necessary to adopt an irrigation system able to avoid water stress especially during the transplanting phase.
This is possible through the adoption of a drip system that allows short, frequent and very precise irrigation interventions. Drip irrigation is the best method for irrigating strawberries, let's see the main advantages:

EFFICIENCY, ENVIRONMENTAL IMPACT AND FLEXIBILITY

- High irrigation efficiency (all the water is distributed to the plants reducing loss by evaporation to a minimum). On one hand mulching reduces losses due to evapotranspiration, on the other its presence completely eliminates the effect of atmospheric precipitations. Therefore it is even more necessary to deliver the water under the mulch while sprinkler irrigation is not recommended;
- High Emission Uniformity and consequent crop uniformity;
- Increase in yields thanks also to the adoption of fertigation practices;
- Reduction of weed growth and consequent less use of herbicides;
- Water saving;
- Energy saving (thanks to the lower operating pressure compared with sprinklers);
- Excellent emission uniformity even on surfaces with irregular perimeters, rounded corners or in proximity of roads or houses;
- Possibility of increasing the cultivatable surface in areas where water resources are scarce.

HEALTHY PLANTS FOR QUALITY PRODUCTION

- Defense against water stress: throughout its cultivation cycle, the strawberry is particularly sensitive even to short periods of water stress (this due to the shallow root system);
- Better and more precise irrigation management capable of avoiding states of root asphyxiation or rotting of plants' collar;
- High organoleptic properties and high sugar content: the correct fertigation management and the supply of the right amount of micro and macro elements allow to obtain high quality products;
- High crop uniformity;
- Reduction of fungal diseases encouraged by water stagnation on the foliage.

FERTIGATION

- In the spring stages, fertigation is important to ensure the development of a large leaf area capable of feeding the fruits in the best way;
- Precise and uniform application of the fertilizer and consequent significant savings;
- Optimisation of the fertilizer distribution according to nutritional needs;
- Possibility of intervening in case of lack of nutrients;
- Reduction of the environmental impact.

SYSTEM MANAGEMENT

- Possibility of irrigating even in windy conditions, fully complying with the irrigation program;
- Ability to access the field at any time;
- Ease of irrigation system management and of overall farm management;
- Possibility of installing long laterals reducing the number of irrigation sectors to a minimum.

A continuous wetting pattern, the great advantage of closely spaced emitters.

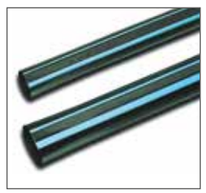
When choosing the right spacing between the emitters, several variables must be taken into account, such as the crop, the type of soil and its salinity, the topography of the ground and certainly the type of planting layout chosen.
Numerous studies highlight the important advantages of adopting closely spaced emitters. This is particularly important for those crops, such as strawberry, with a reduced root system.
Closely spaced emitters allows to obtain a correct and continuous wetting pattern with no drip tape cost increase. A quick implementation of a continuous wetting pattern is important for delivering to all plants - at the same time - the same amount of water and nutrients (in the case of larger spacing, the time needed to get a continuous wetting pattern results in deep percolation causing waste of water and fertilizers).
It should also be said that strawberry could be grown on light and well-drained soils on which, it should be remembered, the adoption of closely spaced emitters become even more important.
In loose soils, in fact, the force of gravity prevails over the horizontal movement of the water. Strawberries can be grown in sandy soils, but closely spaced emitters becomes more important.

The picture shows two drip tapes with the same flow rate per metre, specifically 5.70 l/h/m; the left drip tape has a 1.14 l/h emitter with a 20 cm spacing, the right one has a 0.57 l/h emitter with a 10 cm spacing. It is therefore obvious that the drip tape with a closer spacing is faster in forming a continuous wetting pattern.

OUR EXPERIENCE, OUR SOLUTIONS

Since the 1990s, Toro has been successfully realised drip irrigation systems for strawberry growing, all over the world. Toro offers farmers two innovative solutions:

Aqua-Traxx® PBX: this is Toro premium drip tape that provides unmatched clog resistance and durability even when using poor quality water.



Aqua-Traxx® FlowControl™: this is Toro's latest advancement in the evolution of drip irrigation; FlowControl™ is the only flow-regulating drip tape available giving you increased uniformity and control wherever you farm.

FLAT LANDS

Where the orography of the ground allows it, or on flat surfaces, **Aqua-Traxx® PBX** represents the best solution to deliver water and nutrients. Specifically for strawberry cultivations, Toro offers the following solutions:

- 10, 15 and 20 cm spacings;
- 1.41/1.14/0.87/0.64/0.57/0.42 and 0.30 l/h @ 0.7 bar emitters;
- 16 mm diameter, 6 and 8 mil thicknesses;
- 22 mm diameter, 8 and 10 mil thicknesses.

Aqua-Traxx® PBX 5/8" (16 mm) Diameter — Slope 0%

Model	Individual Emitter Flow Rate @ 0,7 bar	Emitter Spacing	Emission Uniformity (EU)	Maximum Lateral Lengths in meters					
				@ 0,5 bar	@ 0,6 bar	@ 0,7 bar	@ 0,8 bar	@ 0,9 bar	@ 1,0 bar
RA5xx04170-yyy	1,41 l/h	10 cm	85% 90%	90 73	92 74	93 74	93 75	94 75	94 76
RA5xx06112-yyy	1,41 l/h	15 cm	85% 90%	95 94	109 95	119 96	120 96	121 97	122 98
RA5xx0884-yyy	1,41 l/h	20 cm	85% 90%	140 113	142 114	144 115	145 116	146 118	147 118
RA5xx04134-yyy	1,14 l/h	10 cm	85% 90%	104 84	105 85	106 85	107 86	108 87	108 87
RA5xx0867-yyy	1,14 l/h	20 cm	85% 90%	162 131	164 132	165 133	167 134	168 135	170 136
RA5xx04100-yyy	0,87 l/h	10 cm	85% 90%	127 102	128 103	129 104	130 105	131 105	132 106
RA5xx0667-yyy	0,87 l/h	15 cm	85% 90%	163 132	165 133	167 135	168 136	170 136	171 137
RA5xx0851-yyy	0,87 l/h	20 cm	85% 90%	197 159	199 160	201 161	202 163	204 164	205 165
RA5xx0650-yyy	0,64 l/h	15 cm	85% 90%	197 159	200 160	201 162	202 163	204 164	205 165
RA5xx0467-yyy	0,57 l/h	10 cm	85% 90%	166 134	168 135	170 137	171 138	173 139	174 139
RA5xx0834-yyy	0,57 l/h	20 cm	85% 90%	259 209	262 211	264 213	266 214	268 216	269 217
RA5xx0825-yyy	0,42 l/h	20 cm	85% 90%	302 241	304 242	305 243	306 244	307 245	308 245
RA5xx0822-yyy	0,38 l/h	20 cm	85% 90%	322 258	324 259	326 260	327 261	328 263	329 263
RA5xx0817-yyy	0,30 l/h	20 cm	85% 90%	379 304	381 305	383 306	384 308	385 308	386 308

Aqua-Traxx® PBX 7/8" (22 mm) Diameter — Slope 0%

Model	Individual Emitter Flow Rate @ 0,7 bar	Emitter Spacing	Emission Uniformity (EU)	Maximum Lateral Lengths in meters					
				@ 0,5 bar	@ 0,6 bar	@ 0,7 bar	@ 0,8 bar	@ 0,9 bar	@ 1,0 bar
RA7xx06112-yyy	1,41 l/h	15 cm	85% 90%	194 192	224 194	245 197	246 198	249 200	251 201
RA7xx0867-yyy	1,14 l/h	20 cm	85% 90%	288 233	291 235	294 237	296 239	298 240	301 242
RA7xx04100-yyy	0,87 l/h	10 cm	85% 90%	225 181	227 183	229 185	231 186	233 187	234 188
RA7xx0667-yyy	0,87 l/h	15 cm	85% 90%	291 234	294 237	296 239	300 241	301 243	303 244
RA7xx0851-yyy	0,87 l/h	20 cm	85% 90%	349 282	354 285	357 287	359 289	362 291	364 293
RA7xx0467-yyy	0,57 l/h	10 cm	85% 90%	295 238	298 241	302 243	304 245	306 246	308 249
RA7xx0834-yyy	0,57 l/h	20 cm	85% 90%	460 370	464 374	468 379	472 382	475 383	478 387
RA7xx0825-yyy	0,42 l/h	20 cm	85% 90%	528 426	531 428	534 431	536 433	538 434	539 435
RA7xx0822-yyy	0,38 l/h	20 cm	85% 90%	566 457	569 459	571 461	573 462	574 463	576 465
RA7xx0817-yyy	0,30 l/h	20 cm	85% 90%	664 536	668 539	671 541	673 543	674 544	677 546

Aqua-Traxx® PBX is also available in other models. Request further information.

SYSTEMS WITH LONG LATERALS OR LANDS WITH DIFFICULT TOPOGRAPHICAL CONDITIONS

Poor emission uniformity has serious consequences on strawberries because it causes uneven production and cultivation. In any condition but even more in the case of very long laterals or on hilly / undulating terrains, it is good to use drip tapes able of distributing water and fertilizers perfectly.
In all these situations, **Aqua-Traxx® FlowControl™**, thanks to its innovative FlowControl™ technology, ensures extraordinary emission uniformity:
Aqua-Traxx® FlowControl™, is available with:

- 15 and 20 cm spacings;
- 1.01 and 0.76 l/h @ 0.7 bar emitters;
- 16 mm diameter, 8, 10 and 15 mil thicknesses;
- 22 mm diameter, 10 and 15 mil thicknesses.

Aqua-Traxx® FlowControl™ 5/8" (16 mm) Diameter — Slope 0%

Model	Individual Emitter Flow Rate @ 0,7 bar	Emitter Spacing	Emission Uniformity (EU)	Maximum Lateral Lengths in meters			
				@ 0,7 bar	@ 1,0 bar	@ 1,4 bar	@ 1,7 bar
EAFC5xx0690-yyy	1,01 l/h	15 cm	90%	124	131	139	145
EAFC5xx0867-yyy	1,01 l/h	20 cm	90%	148	157	168	174
EAFC5xx0667-yyy	0,76 l/h	15 cm	90%	150	159	168	175
EAFC5xx0850-yyy	0,76 l/h	20 cm	90%	181	193	202	211

Aqua-Traxx® FlowControl™ 7/8" (22 mm) Diameter — Slope 0%

Model	Individual Emitter Flow Rate @ 0,7 bar	Emitter Spacing	Emission Uniformity (EU)	Maximum Lateral Lengths in meters		
				@ 0,7 bar	@ 1,0 bar	@ 1,4 bar
EAFC7xx0690-yyy	1,01 l/h	15 cm	90%	217	230	244
EAFC7xx0867-yyy	1,01 l/h	20 cm	90%	261	277	294
EAFC7xx0667-yyy	0,76 l/h	15 cm	90%	263	279	296
EAFC7xx0850-yyy	0,76 l/h	20 cm	90%	318	337	355

Aqua-Traxx® FlowControl™ is also available in other models. Request further information.

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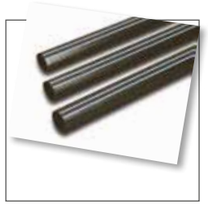
HYDROPONIC STRAWBERRIES

In case of hydroponic strawberries grown on inert substrate, the drip irrigation system plays a very important role. Soilless, strawberries have very high irrigation needs, requiring frequent, short and very precise cycles.
The best irrigation system is represented by pressure-compensating anti-leak drippers in combination with distribution kits (spiders) that allow a precise and accurate distribution to all plants.

NGE® AL: this is the Toro Pressure-Compensating Anti-Leak dripper capable of delivering a precise flow rate season after season. NGE® AL prevents line drainage thus allowing high distribution uniformity even in the case of short and frequent irrigation cycles. It is highly resistant to chemical agents, low pH and all those substances typically used in agriculture.
The NGE® AL drippers are available in:

- 4 flow rates: 2, 3, 4 and 8 l / h (between 1.0 and 4.1 bar);
- 2 outlets: 3 mm barbed and with Male Adapter.

SPIDERS: from a NGE® dripper, Spider Kits allow to deliver water directly into the substrate.
Toro Spider Kits are available in many different configurations:



- 1, 2 or 4 outlets; 1-outlet models are available with and without adapter respectively for NGE® AL with Male Adapter or 3 mm barbed outlet;
- With 3x5 mm microtubes 60 and 80 cm long.

High yields with organoleptic properties.

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TESTIMONIALS

Frank Estrada
Reiter Berry Farms
Watsonville, CA, USA

"The key to successfully setting transplants with drip tape is soil prep, tape placement and irrigation scheduling.
With drip, I'm not applying water in-between the beds, so weed growth is greatly reduced. With sprinklers, weeds germinate everywhere and I am forced to hand weed, which is expensive."

strawberry

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