

The TORO logo is displayed in white, bold, uppercase letters within a red rounded rectangular background. The 'O' at the end has a registered trademark symbol (®) to its upper right.

TORO®

Strawberries Drip Irrigation

High Yields with
Organoleptic Properties.



strawberry



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Organoleptic Properties.

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.

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.



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.

Aqua-Traxx® FlowControl™:

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	92	93	93	94	94
			90%	73	74	74	75	75	76
RA5xx06112-yyy	1,41 l/h	15 cm	85%	95	109	119	120	121	122
			90%	94	95	96	96	97	98
RA5xx0884-yyy	1,41 l/h	20 cm	85%	140	142	144	145	146	147
			90%	113	114	115	116	118	118
RA5xx04134-yyy	1,14 l/h	10 cm	85%	104	105	106	107	108	108
			90%	84	85	85	86	87	87
RA5xx0867-yyy	1,14 l/h	20 cm	85%	162	164	165	167	168	170
			90%	131	132	133	134	135	136
RA5xx04100-yyy	0,87 l/h	10 cm	85%	127	128	129	130	131	132
			90%	102	103	104	105	105	106
RA5xx0667-yyy	0,87 l/h	15 cm	85%	163	165	167	168	170	171
			90%	132	133	135	136	136	137
RA5xx0851-yyy	0,87 l/h	20 cm	85%	197	199	201	202	204	205
			90%	159	160	161	163	164	165
RA5xx0650-yyy	0,64 l/h	15 cm	85%	197	200	201	202	204	205
			90%	159	160	162	163	164	165
RA5xx0467-yyy	0,57 l/h	10 cm	85%	166	168	170	171	173	174
			90%	134	135	137	138	139	139
RA5xx0834-yyy	0,57 l/h	20 cm	85%	259	262	264	266	268	269
			90%	209	211	213	214	216	217
RA5xx0825-yyy	0,42 l/h	20 cm	85%	302	304	305	306	307	308
			90%	241	242	243	244	245	245
RA5xx0822-yyy	0,38 l/h	20 cm	85%	322	324	326	327	328	329
			90%	258	259	260	261	263	263
RA5xx0817-yyy	0,30 l/h	20 cm	85%	379	381	383	384	385	386
			90%	304	305	306	308	308	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%	194	224	245	246	249	251
			90%	192	194	197	198	200	201
RA7xx0867-yyy	1,14 l/h	20 cm	85%	288	291	294	296	298	301
			90%	233	235	237	239	240	242
RA7xx04100-yyy	0,87 l/h	10 cm	85%	225	227	229	231	233	234
			90%	181	183	185	186	187	188
RA7xx0667-yyy	0,87 l/h	15 cm	85%	291	294	296	300	301	303
			90%	234	237	239	241	243	244
RA7xx0851-yyy	0,87 l/h	20 cm	85%	347	354	357	359	362	364
			90%	282	285	287	289	291	293
RA7xx0467-yyy	0,57 l/h	10 cm	85%	295	298	302	304	306	308
			90%	238	241	243	245	246	249
RA7xx0834-yyy	0,57 l/h	20 cm	85%	460	464	468	472	475	478
			90%	370	374	379	382	383	387
RA7xx0825-yyy	0,42 l/h	20 cm	85%	528	531	534	536	538	539
			90%	426	428	431	433	434	435
RA7xx0822-yyy	0,38 l/h	20 cm	85%	566	569	571	573	574	576
			90%	457	459	461	462	463	465
RA7xx0817-yyy	0,30 l/h	20 cm	85%	664	668	671	673	674	677
			90%	536	539	541	543	544	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.



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.



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

TORO[®]



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