



Irrigation of young pears

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Aim: To investigate the effects of drip irrigation and irrigation interval in newly planted pear orchards on irrigation requirement, water status, growth and yield.

Treatments:

Drip (1.75 l/h @ 0.5 m spacing) versus microjet (32 l/h @ 2.0 m spacing).
Standard versus frequent intervals.

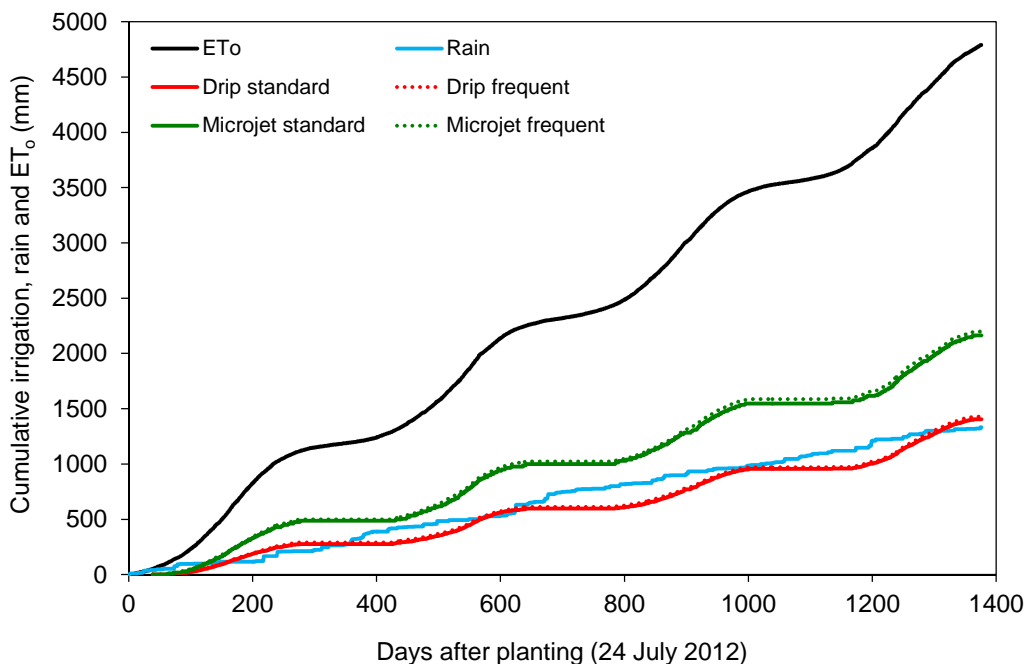
Treatment	Run-time	Irrigation interval (Year 4)		
		Spring	Summer	Autumn
Drip standard	6 h	3 days	1 – 2 days	3 days
Drip frequent	2 h	Daily	Twice daily	Daily
Microjet standard	3 h 30 min	7 days	3 days	6 days
Microjet frequent	1 h 10 min	2 days	Daily	2 days

- Run time was based on standard wetted depth = 0.3 m
- Interval calculated from $ET_c = 1.3 EAS ET_o + K_e ET_o$
 - ET_c was the crop evapotranspiration
 - EAS was the effective area of shade
 - ET_o was the reference crop evapotranspiration
 - K_e was the soil evaporation coefficient (Drip = 0.05 – 0.15, Microjet = 0.2 – 0.35)



Irrigation, rainfall and evapotranspiration

Over 4 years since planting in July 2012, drip and microjet treatments applied 14.3 and 22 MI/ha, respectively. In year 4 (2015/16 season), 4.5 and 6.1 MI/ha were applied to drip and microjet treatments, respectively.



Tree water stress

Stem water potential was measured during each season. In Year 1, drip irrigated trees were less stressed than microjet irrigated trees. In Year 3 and 4, frequently irrigated trees were less stressed than trees irrigated at the standard interval. Note: less negative stem water potential means less plant water stress.

Treatment	Stem water potential (MPa)			
	Year 1	Year 2	Year 3	Year 4
Drip standard	-1.10	-0.89	-1.32	-1.40
Drip frequent	-1.04	-0.86	-1.26	-1.28
Microjet standard	-1.13	-0.88	-1.32	-1.63
Microjet frequent	-1.18	-0.91	-1.24	-1.26
<i>F prob. (Sys)</i>	0.02	NS	NS	0.02
<i>F prob. (Freq)</i>	NS	NS	0.02	<0.001

Vegetative growth

There was no difference in leader growth during each of the first 3 years. The majority of leaders had reached the top wire. There was no difference in light interception in Year 4.

Treatment	Leader growth (cm)			Light interception (%)
	Year 1	Year 2	Year 3	Year 4
Drip standard	74.2	89.6	40.5	33
Drip frequent	76.7	85.3	38.1	36
Microjet standard	79.4	85.6	38.8	33
Microjet frequent	67.9	84.9	43.0	32
<i>F prob. (Sys)</i>	NS	NS	NS	NS
<i>F prob. (Freq)</i>	NS	NS	NS	NS

Yield

Yield was greater in the drip irrigation treatments attributed to fruit number per tree. There was a greater density of spur flower clusters in the drip treatments. Fruit size was greater in the frequently irrigated treatments.

Treatment	Yield (kg/tree)	Fruit weight (g)	Fruit number per tree	Node number per tree	Spur cluster number per tree
Drip standard	8.63	119.1	73.4	435	106
Drip frequent	8.82	125.0	71.2	436	126
Microjet standard	4.79	108.7	45.1	414	99
Microjet frequent	5.65	129.1	44.1	431	69
<i>F prob. (Sys)</i>	<0.001	NS	<0.001	NS	0.025
<i>F prob. (Freq)</i>	NS	0.002	NS	NS	NS

Key Messages

- 35% less irrigation was applied in the drip treatments
- Drip irrigated trees in Year 1 were less stressed
- Frequently irrigated trees in Years 3 and 4 were less stressed
- There was no effect of drip irrigation or irrigation interval on young tree growth
- Yield increased by 167% under drip irrigation attributed to fruit number
- Spur flower cluster number was higher under drip irrigation
- Fruit size was greater under frequent irrigation

