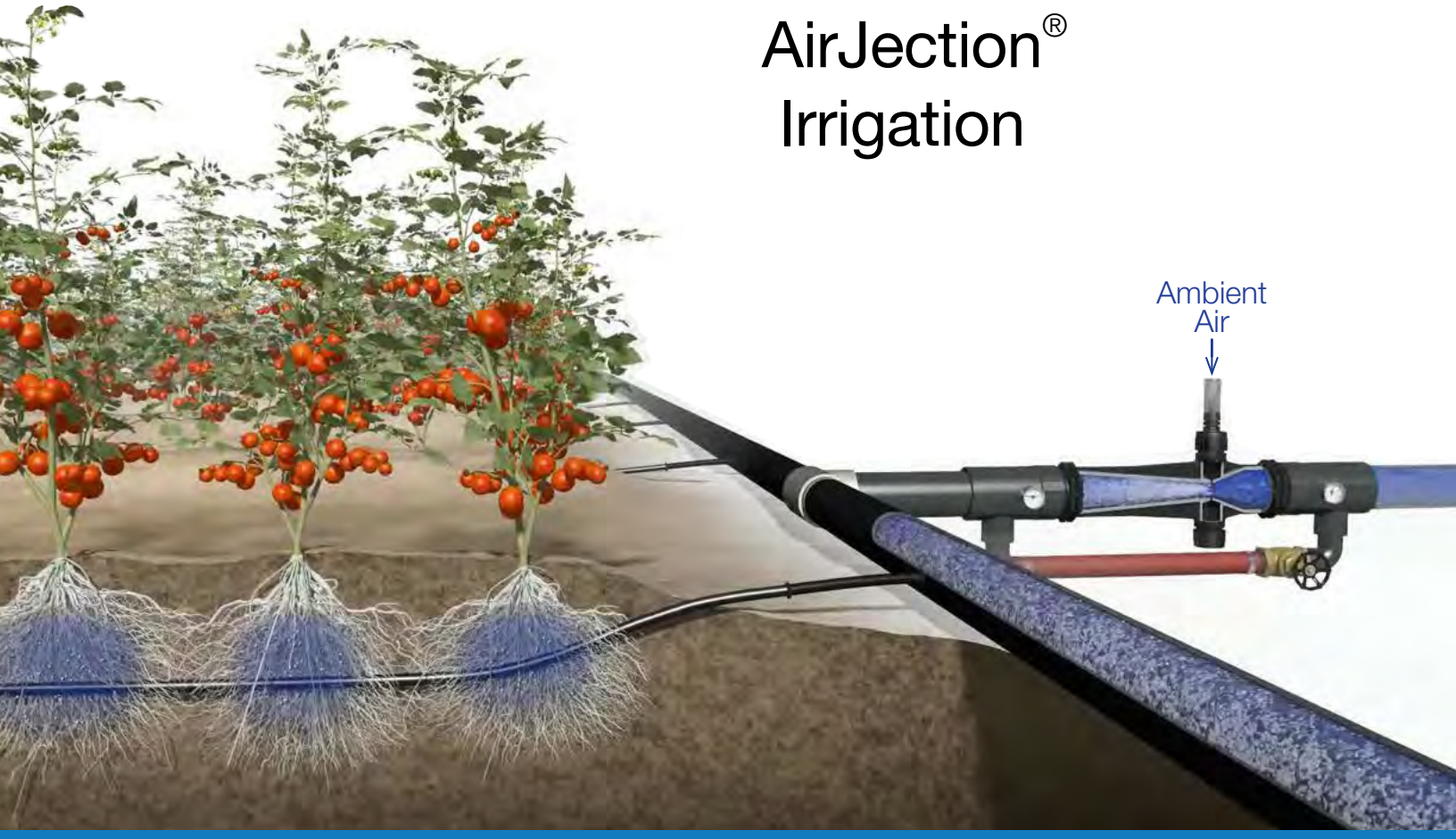
Two Basic Ingredients are Necessary for Plant Roots to Thrive—Air and Water

Mazzei®

AirJection® Irrigation



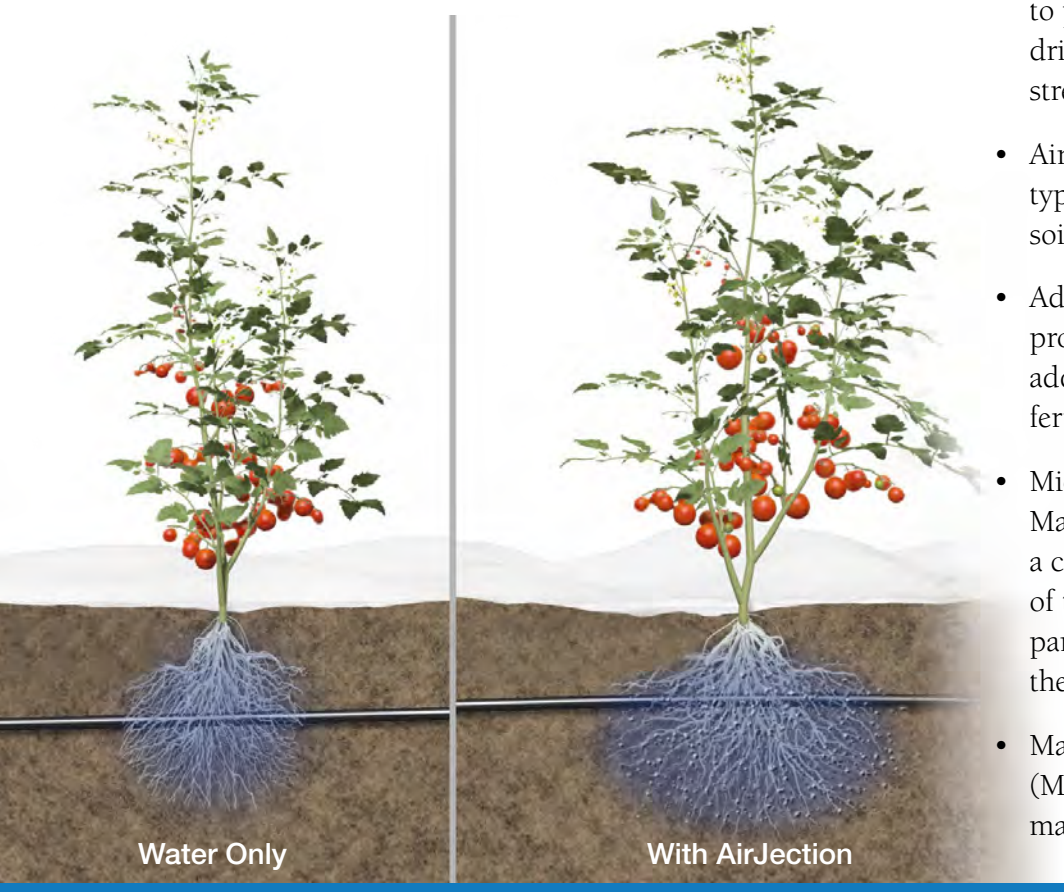
Injecting Air Directly to the Root Zone to Improve Crop Yield and Quality

AirJection Irrigation

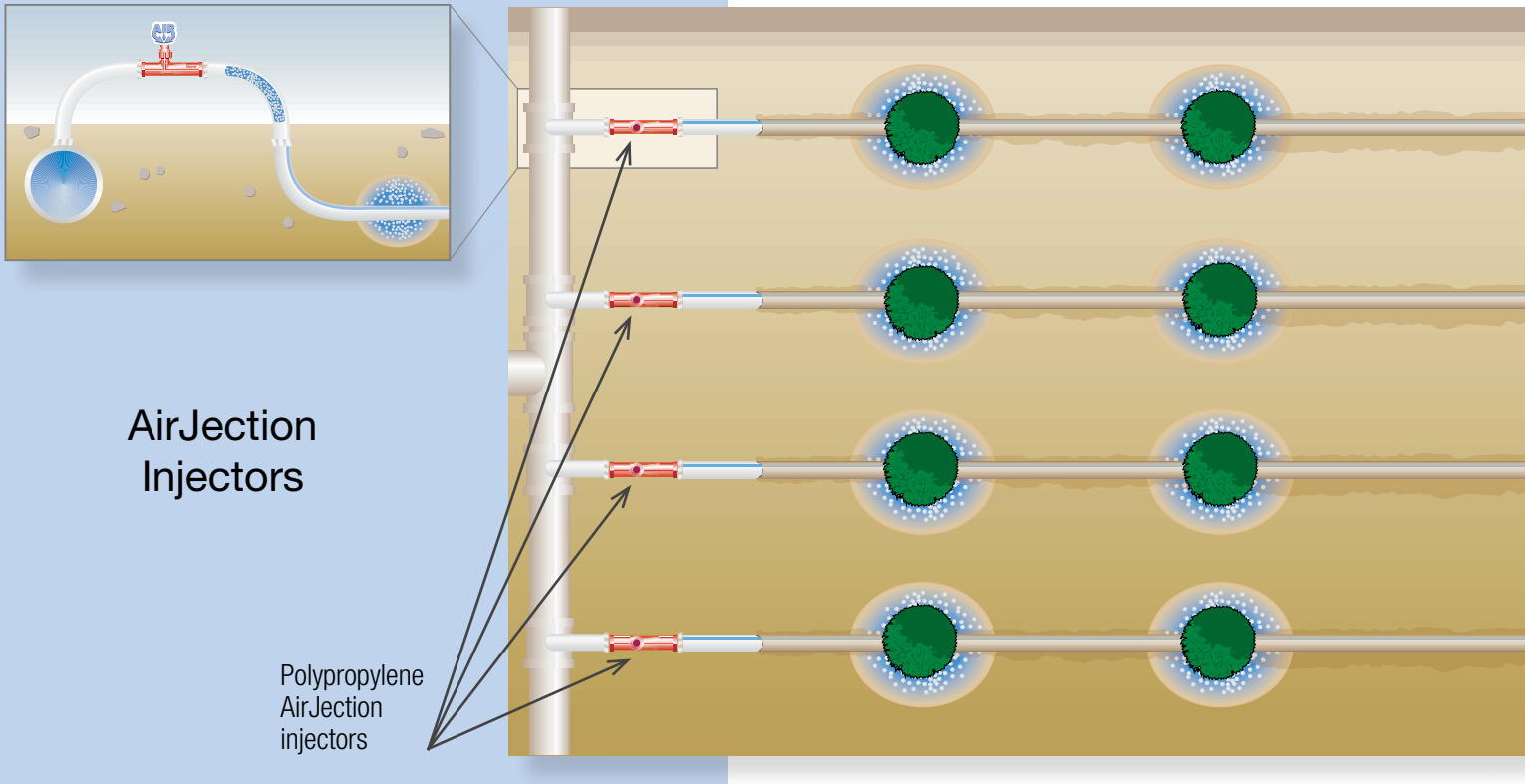
When added to subsurface drip lines, Mazzei AirJection® incorporates atmospheric air into irrigation water at optimum levels and delivers it to the root zone, improving aerobic activity in the soil and increasing root respiration. Crop yields, water use efficiency and fertilizer effectiveness are improved by delivering air (oxygen and nitrogen) directly to the rhizosphere.

AirJection Advantages

- Increases crop yield, leaf area, sugar content, germination and fruit density
- Allows earlier season harvest and improves late-season production
- Increases root mass resulting in greater nutrient uptake, better nutrient use efficiency (NUE) and reduced fertilizer application rates
- Creates a better soil environment that increases beneficial microbial activity in the soil, which improves growing conditions



- Reduces plant stress
- Increases water infiltration rates
- Improves water use efficiency (WUE)
- Increases plants' salinity tolerance
- Improves plant canopy size and reduces damage by the sun
- Tests performed with an infrared thermometer indicate lower levels of stress on air-injected plants as compared to plants irrigated with conventional drip—results show less yield loss due to stress
- AirJection has been successful on all soil types—it is especially beneficial in clay soils, where oxygen is easily depleted
- Added benefits for growers of organic produce. Reduces the need for additional soil amendments and organic fertilizers
- Micro-bubbles produced by the Mazzei AirJection irrigation unit have a cleaning effect on the inner walls of the drip tape and tubing keeping particulates in suspension and reducing the chance of plugging
- Mazzei Manifold AirJection Irrigation (MAI) system's single valve operation makes it easy to operate



Why AirJection?

Inadequate soil aeration reduces the rate of water and mineral absorption by roots. Saturated soils will trap metabolites, ethylene and carbon dioxide in the root zone, where high concentrations can seriously affect the rate of growth and size of the plant. Oxygen is also necessary for the survival of beneficial soil micro-organisms that aid in improving soil physical properties and processes such as nitrification and ammonification.

Simply put…plant roots need air to breathe. Without it, soil can become anaerobic, inhibiting nutrient availability, plant growth and crop yields.

The Center for Irrigation Technology at California State University, Fresno, has conducted numerous trials using AirJection since 2000. Data from university-led trials and grower installations has shown that commercial on-farm use of Mazzei AirJection technology can increase crop yields between 13% and 35% as a result of improved plant performance and soil conditions. Quality improvements have also been demonstrated in a variety of fruit and vegetable crops.

AirJection Installation

AirJection can be installed using two different methods. Mazzei AirJection injectors (above) can be employed on individual drip hose/tape or AirJection can be implemented through our MAI manifold (right) for oval, lay-flat or pressure-compensating systems. Both methods are efficient, easy-to-install, and require low maintenance.

The MAI unit is installed at the turn-out valve of the block and is able to seamlessly adjust to varying water flow rates. The heart of the manifold, the Mazzei venturi injector, allows a specific amount of water to flow through it at a given pressure. The remaining water, if any, flows through the bypass assembly. One simply monitors the installed pressure gauges and adjusts the bypass valve to achieve the desired operating condition. It is designed to meter an approximate air to water ratio with minimal deviation.

MAI must be used when utilizing drip tape with pressure compensating emitters, and air relief valves should be installed at the ends of the distribution system.

Contact Mazzei to determine which method is best for your project.

AirJection® Irrigation MAI

Selection & Calibration Guidelines for MAI Manifold

2” Model MAI-2081 Male NPT

89 to 184 GPM

Inlet Pressure (PSIG)	Bypass Valve Position (Turns Open)	Water Flow (GPM)	Orifice Plate No.
30	0	89	107
	2	106	125
	4	116	125
	6	123	125
40	0	102	107
	2	124	107
	4	140	125
	6	150	125
50	0	114	107
	2	135	107
	4	158	125
	6	171	125
60	0	121	107
	2	152	107
	4	177	125
	6	184	125

3” Model MAI-3090 Male NPT

210 to 374 GPM

Inlet Pressure (PSIG)	Bypass Valve Position (Turns Open)	Water Flow (GPM)	Orifice Plate No.
30	0	210	151
	2	234	151
	4	253	172
	6	273	182
	8	279	182
40	0	246	151
	2	268	151
	4	303	172
	6	314	182
	8	316	182
50	0	263	151
	2	289	172
	4	325	182
	6	347	182
	8	349	182
60	0	287	151
	2	312	172
	4	354	182
	6	373	182
	8	374	182

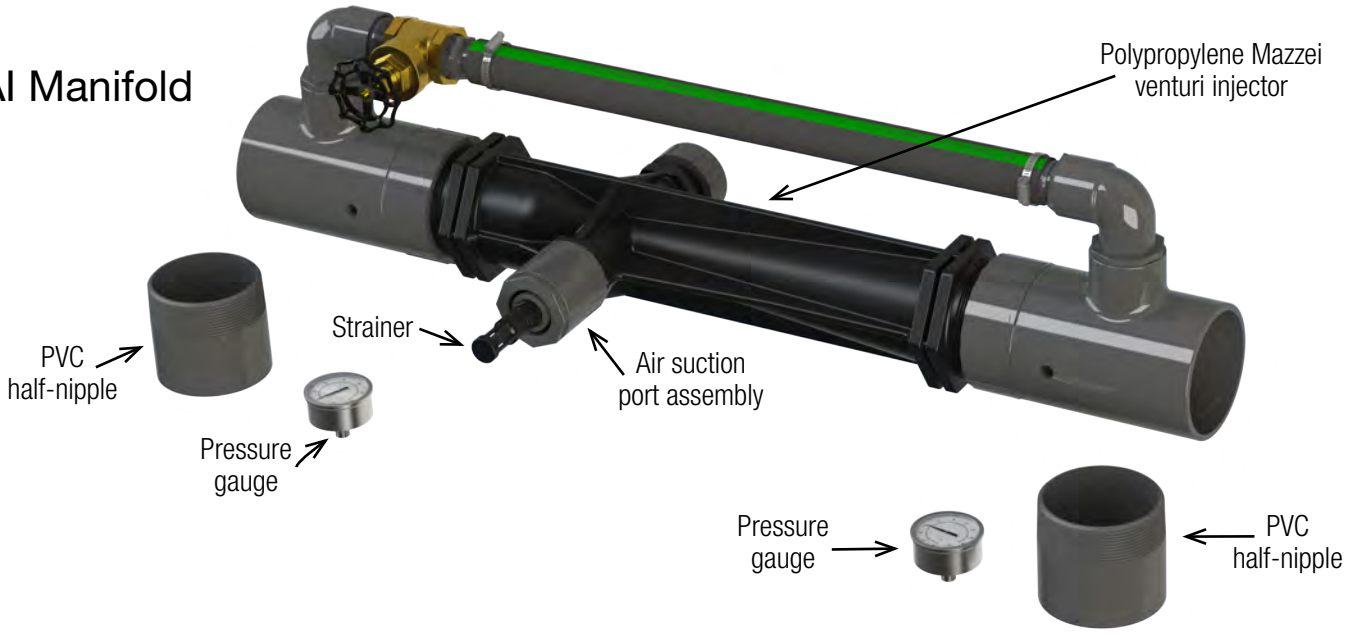
4” Model MAI-4091 Male NPT

350 to 661 GPM

Inlet Pressure (PSIG)	Bypass Valve Position (Turns Open)	Water Flow (GPM)	Orifice Plate No.
30	0	350	196
	2	437	196
	4	503	218
	6	527	218
	8	531	218
40	0	392	196
	2	492	218
	4	570	218
	6	598	250
	8	600	250
50	0	429	196
	2	542	218
	4	628	250
	6	658	250
	8	661	250

NOTE: To use an MAI manifold in an application, a minimum of 30 PSI at the inlet of the unit must exist. The goal is to inject an air/water mixture of 10-18%.

MAI Manifold



Commercial Bell Pepper Operation

AirJection Irrigation Test Results

Planting:	March 2000
Field Acreage:	66.97 acres (38.11 Control acres and 28.85 AirJection acres)
Bell Pepper Variety:	Baron (transplants)
Soil Type:	Loam to Sandy Loam
Location:	Edison, California

Both the Non-aerated Control and AirJection Aerated Plots used the following layout:

- Subsurface drip tape (3.40 GPM / 1,000 ft) buried 5 inches deep
- 98 rows x 40" spacing x 640' per block = 213 GPM total water flow per block

AirJection Aerated Test Plot used the following configuration to supply the air/water mixture:

- 6 Model 3090 MAI units
- 90+ % of the water flowed through injector
- Pressure at injector = 60 psi
- Pressure at the head of the tape = 12 psi

Non-Aerated Control Acreage = 38.11

Green Premium	Red Premium	Red Processed	Total		Total	Red Processed	Red Premium	Green Premium
22.38	17.72	43.26	**83.36**	**Bins/Acre**	**91.96**	46.74	23.73	21.49
403	319	778	**1,500**	**Cartons/Acre**	**1,655**	841	427	387
11,194	8,861	21,611	**41,666**	**Lbs/Acre**	**45,972**	23,361	11,861	10,750

AirJection Aerated Acreage = 28.85

Premium Cartons/Acre Control = 722 AirJection = 814
Processed Cartons/Acre Control = 778 AirJection = 841
NOTE: 1 bin = approximately 18 cartons = 500 lbs

CONCLUSIONS

- Premium production **INCREASE per AirJection** aerated acre:
  92 Cartons = 2,556 lbs—increase of 12.8%.
- Processed production **INCREASE per AirJection** aerated acre:
  63 Cartons = 1,750 lbs—increase of 8.1%.
- Total production **INCREASE per AirJection** aerated acre:
  55 Cartons = 4,306 lbs—increase of 10.3%.

MADE IN U. S. A.

Why Mazzei

Since 1978, Mazzei has distinguished itself by its ability to evaluate problems and develop innovative solutions for injection and mixing.
When you need a system and a supplier that delivers long-lasting service and value, there's only one name you need to remember: Mazzei.

Mazzei®

World Leader in Mixing and Contacting Technologies

Contact us today.

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