

Establishing Environmental Data for Monitoring Foliar Diseases in a Nursery Setting

Dr. J.T. Walker

Plant diseases are common occurrences in nurseries and considerable effort is devoted to minimizing their effects by different management practices. Since most of the diseases are caused by fungi and these fungi may produce tremendous numbers of spores (conidia) which germinate and penetrate susceptible plant parts under moist conditions, it was the objective of this project to determine how long water or moisture may be present in a nursery environment, and eventually to monitor the presence of leaf spot disease on susceptible plants and relate this information to the number of hours wetness that occur during a growing season.

At the Center for Applied Nursery Research two meteorological monitoring systems were installed with leaf wetness sensors. One of the systems, when operating, provides air temperature, evapo-transportation, solar radiation, barometric pressure, wind speed and wind direction, relative humidity and precipitation information at pre-set intervals. The other system is a backup for the leaf wetness sensor. Wiring from the weather station shelters to a computer in the Center's building allows for storage, summation, and retrieval of data. Phone modems eventually will permit transmission of this information to off-site locations.

An example of the information obtained from one system is provided for August 30, 1997. The irrigations system, set for 6:30 am, completely wet the leaves for 2 ½ hours and partially wet them for an additional hour. If temperatures were optimum for a particular fungal spore to germinate, it may have produced a germ tube and invaded a susceptible leaf in that period. A brief afternoon shower (1:30 pm) wet the leaves but apparently became dry after one hour.

Weather information from our National Weather Service is important for many activities including agricultural practices. However, in order to understand the effect of micro environmental on disease development the data must be obtained where the plants are growing. In any facet of growing plants, the more we can learn about the impact of different environments the better management can plan, produce and market their products economically.

Time	Air Temp	Hi	Low	ET	Soil Temp	Leaf	S. Rad	S. En	Deg. Days	Bar	Wind Speed	Hi	Dir	Wind Chill	Wind Run	Rain	Hi Rate	Humt	Dew Point	T.E. Index	A. Fer.
12:00a	78.7	79.0	78.5	.001	---	0	0	0.0	0.0	30.565	0.0	3.0	NE	78.7	0.1	0.00	0.0	70	68.1	81.9	30
12:30a	77.7	79.0	76.6	---	---	0	0	0.0	0.0	30.566	0.0	0.0	---	77.7	0.0	0.00	0.0	76	69.5	81.2	30
1:00a	76.1	76.6	75.2	.001	---	0	0	0.0	0.0	30.558	0.0	0.0	---	76.1	0.0	0.00	0.0	81	69.9	79.1	30
1:30a	74.5	75.2	73.9	---	---	0	0	0.0	0.0	30.559	0.0	0.0	---	74.5	0.0	0.00	0.0	85	70.0	77.6	30
2:00a	73.6	73.9	73.4	.000	---	0	0	0.0	0.0	30.554	0.0	0.0	---	73.6	0.0	0.00	0.0	87	69.5	75.0	30
2:30a	73.1	73.4	72.5	---	---	0	0	0.0	0.0	30.556	0.0	0.0	---	73.1	0.0	0.00	0.0	89	69.7	75.0	30
3:00a	71.7	72.5	71.1	.000	---	0	0	0.0	0.0	30.538	0.0	0.0	---	71.7	0.0	0.00	0.0	92	69.3	74.4	30
3:30a	70.8	71.1	70.6	---	---	0	0	0.0	0.0	30.562	0.0	0.0	---	70.8	0.0	0.00	0.0	94	69.0	73.8	30
4:00a	70.2	78.6	69.8	.000	---	0	0	0.0	0.0	30.564	0.0	0.0	---	70.2	0.0	0.00	0.0	94	68.4	72.6	30
4:30a	69.6	69.8	69.5	---	---	0	0	0.0	0.0	30.575	0.0	0.0	---	69.6	0.0	0.00	0.0	96	65.4	73.2	30
5:00a	69.2	69.5	69.0	.000	---	0	0	0.0	0.0	30.572	0.0	0.0	---	69.2	0.0	0.00	0.0	97	68.3	71.7	30
5:30a	68.7	69.0	68.6	---	---	0	0	0.0	0.0	30.575	0.0	0.0	---	68.7	0.0	0.00	0.0	98	68.1	71.8	30
6:00a	68.4	68.6	68.0	.000	---	0	0	0.0	0.0	30.587	0.0	0.0	---	68.4	0.0	0.00	0.0	99	68.1	70.0	30
6:30a	68.3	68.8	68.0	---	---	15	0	0.0	0.0	30.596	0.0	1.0	---	68.3	0.0	1.07	5.5	100	68.3	70.0	30
7:00a	67.9	68.0	67.8	.000	---	15	0	0.0	0.0	30.599	0.0	1.0	---	67.9	0.0	0.00	3.8	100	67.9	---	30
7:30a	68.3	68.2	67.9	---	---	15	0	0.0	0.0	30.616	0.0	1.0	---	68.3	0.0	0.00	0.0	100	68.1	70.0	30
8:00a	68.4	68.6	68.1	.000	---	15	36	1.6	0.0	30.631	0.0	1.0	ESE	68.4	0.0	0.00	0.0	100	68.4	70.0	30
8:30a	69.1	69.8	68.6	---	---	15	83	3.5	0.0	30.636	0.0	1.0	NE	69.1	0.0	0.00	0.0	100	69.1	72.0	30
9:00a	70.5	71.2	69.8	.003	---	14	224	5.6	0.0	30.630	0.0	2.0	ENE	70.5	0.2	0.00	0.0	99	70.2	74.8	30
9:30a	72.5	73.0	71.2	---	---	9	254	11.4	0.0	30.637	0.0	3.0	ENE	72.1	0.2	0.00	0.0	96	70.9	75.2	30
10:00a	73.8	74.7	73.0	.008	---	1	366	15.8	0.0	30.636	1.0	4.0	ENE	73.8	0.5	0.00	0.0	90	70.7	76.0	30
10:30a	75.7	76.9	74.7	---	---	0	401	17.2	0.0	30.639	2.0	3.0	ENE	75.7	0.3	0.00	0.0	88	71.9	79.8	30
11:00a	77.9	79.2	75.9	.013	---	0	533	23.0	0.0	30.642	0.0	3.0	ENE	77.9	0.2	0.00	0.0	51	71.6	82.1	30
11:30a	80.5	81.5	79.2	---	---	0	543	23.3	0.0	30.640	1.0	7.0	ENE	80.5	0.4	0.00	0.0	76	72.2	86.2	30
12:00p	82.0	82.4	81.5	.017	---	0	578	25.0	0.0	30.533	1.0	3.0	ENE	82.0	0.3	0.00	0.0	74	72.9	97.8	30
12:30p	83.1	84.3	82.4	---	---	0	593	25.4	0.0	30.622	0.0	3.0	ENE	83.1	0.2	0.00	0.0	72	73.1	89.4	30

Time	Air Temp	Hi	Low	ET	Soil Temp	Leaf	S. Rad.	S. En	Deg. Days	Bar	Wind Speed	Hi	Dir	Wind Chill	Wind Run	Rain	Hi Rate	Hum.	Dew Point	T.E. Index	A. Fer
1:00p	85.1	85.1	84.3	.021	---	0	737	31.8	0.0	30.635	1.0	3.0	ENE	95.1	0.3	0.00	0.0	66	72.5	91.4	30
1:30p	85.8	87.5	86.1		---	15	764	32.9	0.0	30.603	1.0	4.0	ENE	86.5	0.3	0.05	5.1	69	75.4	96.6	30
2:00p	86.4	87.7	85.9	.024	---	15	762	32.8	0.0	30.590	0.0	3.0	ENE	86.4	0.2	0.00	5.1	63	72.3	92.2	30
2:30p	88.4	88.7	87.7		---	13	534	22.7	0.0	30.572	0.0	4.0	ENE	88.4	0.3	0.00	0.0	53	74.2	96.2	30
3:00p	69.9	91.2	88.7	.021	---	0	721	31.1	0.0	30.561	1.0	4.0	NW	89.5	0.4	0.00	0.0	57	72.6	97.8	30
3:30p	91.7	92.2	91.2		---	0	695	30.1	0.0	30.548	1.0	6.0	NW	91.7	0.5	0.00	0.0	50	70.4	98.0	30
4:00p	92.5	93.1	92.2	.021	---	0	579	25.4	0.0	30.542	1.0	3.0	NW	92.5	0.3	0.00	0.0	51	71.8	100.7	30
4:30p	92.0	92.5	91.4		---	0	444	19.9	0.0	30.537	0.0	3.0	NW	92.0	0.3	0.00	0.0	53	72.4	99.8	30
5:00p	91.8	92.0	91.5	.014	---	0	396	16.7	0.0	30.532	1.0	4.0	ENE	91.8	0.2	0.00	0.0	48	69.3	97.2	30
5:30p	93.8	92.0	91.5		---	0	436	18.8	0.0	30.529	1.0	4.0	ENE	91.8	0.4	0.00	0.0	50	70.5	98.0	30
6:00p	90.6	91.5	89.8	.012	---	0	288	12.4	0.0	30.537	1.0	4.0	ENE	90.6	0.8	0.00	0.0	54	71.7	98.0	30
6:30p	88.7	89.8	85.6		---	0	228	9.8	0.0	30.564	3.0	11.0	SE	88.7	1.3	0.00	0.0	59	72.5	96.7	30
7:00p	82.8	85.6	80.9	.006	---	0	139	6.0	0.0	30.574	3.0	9.0	SE	82.8	1.7	0.00	0.0	69	71.5	88.6	30
7:30p	79.7	80.9	78.0		---	0	70	3.1	0.0	30.581	2.0	8.0	SE	79.7	1.1	0.00	0.0	73	70.3	83.6	30
8:00p	78.5	79.0	77.9	.002	---	0	23	1.0	0.0	30.584	1.0	4.0	SE	78.5	0.3	0.00	0.0	76	70.3	82.2	30
8:30p	77.4	77.9	77.0		---	0	0	0.0	0.0	30.596	0.0	0.0	---	77.4	0.0	0.00	0.0	78	70.0	80.6	30
9:00p	76.5	77.0	76.2	.001	---	0	0	0.0	0.0	30.620	0.0	2.0	SE	76.5	0.1	0.00	0.0	80	69.9	81.0	30
9:30p	76.1	76.3	75.6		---	0	0	0.0	0.0	30.630	2.0	4.0	SE	76.1	0.9	0.00	0.0	82	70.2	79.2	30
10:00p	75.1	75.6	74.6	.001	---	0	0	0.0	0.0	30.645	2.0	5.0	SE	75.1	0.7	0.00	0.0	85	70.3	77.5	30
10:30p	74.3	74.6	73.9		---	0	0	0.0	0.0	30.648	1.0	4.0	SE	74.3	0.4	0.00	0.0	86	69.8	76.0	30
11:00p	73.4	73.9	72.9	.000	---	0	0	0.0	0.0	30.653	1.0	4.0	SE	73.4	0.3	0.00	0.0	89	70.0	75.0	30
11:30p	72.4	72.9	71.9		---	0	0	0.0	0.0	30.656	0.0	2.0	E	72.4	0.1	0.00	0.0	91	69.6	74.2	30
12:00p	71.7	71.9	71.4	.000	---	0	0	0.0	0.0	30.650	0.0	1.0	E	71.7	0.0	0.00	0.0	93	69.6	74.6	30