COMMENTS ON "YELLOW-LEAF CONDITION OF UNKNOWN CAUSE ON OATS IN ONTARIO"

Geo. W. Robertson[1]

In their article entitled "Yellow-leaf condition of unknown cause on oats in Ontario", Zillinsky and Slykhuis (2) do not discuss cold temperature injury as a possible cause of discoloration. They do hint, however, that "temperature and possibly other environmental factors are of critical importance."

It was pointed out that the affected crops were in the 3-to 4-leaf stage, presumably having been planted prior to May 1. Crops sown after May 1, according to the authors, were unaffected. Since it takes about a month, depending on soil temperature, for seed to germinate and the young plants to reach the 3-to 4-leaf stage, it is apparent that many crops sown late in April would be reaching this stage about the last week in May. Stem elongation and primordia development would be getting underway and the plant would be entering the period of grand growth. At this stage the plant might be undergoing an increasing susceptibility to low-temperature damage, having lost its earlier hardiness.

Abnormally cold weather occurred in western Ontario during the last week of May and lasted for three days. Lowest minimum temperatures, between 25 and 30°F occurred on the 24th (Table 1). Such low temperatures late in May are usually accompanied by clear skies and light winds. These conditions favor strong radiational cooling of the soil and vegetation surfaces and the latter may fall several degrees below the minimum temperature observed in the thermometer shelter. Air drainage would also be quite pronounced resulting in cold air being trapped in low areas, in flat areas with no drainage outlet, and in areas sheltered or protected by trees and hedges. Variations in physical characteristics and wettness of the soil would also affect the degree of radiational cooling. These factors would contribute to a spotty distribution of cooling at leaf level and temperatures might vary up to 10 to 15 degrees colder than the minimum temperatures recorded in the thermometer shelter.

Whether temperatures, ranging up to 20 degrees below freezing, would cause the yellowing of oat leaves may be open to argument. The date of occurrence is about right and the interval between the occurrence of the cold temperatures and the reported inspection of yellowing is not unduly long. The manifestation of a suspected cold effect might not be noticed for several days after the occurrence of the cause. Furthermore, the authors do not say when the manifestation was first observed, but it must have occurred several days before their inspection of the area on 4 June.

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[1]Agro-Meteorological Section, Plant Research Institute, Research Branch, Canada Department of Agriculture, Ottawa, seconded from Meteorological Branch, Department of Transport.

Minimum Temperatures - Southern Ontario - Spring 1963[1]

	May														June	
	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2
Chatham	49	48	49	45	39	32	38	35	40	51	57	54	51	52	52	58
Ridgetown	48	47	48	46	38	31	35	37	40	51	56	53	51	51	53	60
New Glasgow	48	47	48	43	37	35	33	34	38	50	54	53	50	49	47	57
Wallacetown	48	48	48	44	39	36	32	33	37	49	55	53	51	49	45	57
St. Thomas	49	48	48	39	37	36	29	34	38	45	56	52	51	45	48	54
Port Burwell 1.	52	50	48	44	41	36	30	34	38	45	56	53	52	45	46	59
2.	50	50	48	41	37	35	29	35	37	45	56	54	52	46	47	58
3.	51	49	48	38	38	34	28	31	35	43	57	53	52	45	46	58
4.	52	50	48	39	39	34	28	34	37	45	57	53	52	45	46	55
6.	52	50	49	45	41	37	30	34	40	46	56	53	52	45	46	58
Delhi	52	49	47	34	38	33	25	32	35	41	55	53	51	46	45	52
Simcoe	52	51	43	42	35	32	20	38	41	44	54	55	50	47	50	58
Hagersville	52	50	49	39	43	33	28	34	39	41	51	55	52	46	46	52
Oil Springs	47	47	48	37	38	31	31	33	37	43	56	50	50	48		
London	48	49	42	38	35	32	29	35	38	45	56	51	50	44	49	56
Woodstock	51	48	48	38	38	33	28	32	37	40	55	53	49	46	47	55
Brantford	52	49	49	36	40	35	28	33	39	41	54	56	52	46	46	50
Centralia	45	48	43	42	34	34	34	39	41	47	51	49	48	48	50	58
Stratford	49	46	45	40	37	31	28	34	37	44	51	51	46	44	47	56
Kitchener	52	47	47	41	37	32	30	35	40	43	53	52	46	47	50	53
Galt	53	49	47	38	40	34	28	33	38	41	54	54	49	49	48	51
Guelph	52	47	45	36	36	31	26	33	38	40	52	52	45	43	48	51

[1]From Monthly Record Meteorological Observations in Canada, Meteorological Branch, Department of Transport, May, June 1963.

Damage by cold temperature to seedlings of cultivated crops has been discussed by Sellschop, Makkink and Baier (1). In their paper they review other reports of damage and describe a technique for producing similar symptoms under controlled conditions. It appears that the published reports on this topic deal mainly with heat-loving crops such as corn, sugar cane and sorghum.

Whether or not cold temperatures had anything to do with the yellow-leaf condition, the fact still remains that temperatures were unseasonably cold. Because of the possible variability of temperatures at plant level they might have resulted, either directly or indirectly, in very patchy damage to the crop which may have been at a stage when plants were susceptible to cold injury. The authors obviously did not suspect low temperature as a cause of injury.

Literature Cited

1. SELLSCHOP, J.P.F., A.E. MAKKINK and W. BAIER. 1962. Cold chlorosis and other abnormalities in maize seedlings. South African J. of Agr. Sci. 5(2): 199-209.
2. ZILLINSKY, F.J. and J.T. SLYKHUIS. 1963. Yellow-leaf condition of unknown cause on oats in Ontario. Can. Plant Dis. Survey 43(4): 160-162.

PLANT RESEARCH INSTITUTE
OTTAWA, ONTARIO.