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A COMPILATION OF PLANT DISEASES AND DISORDERS IN INDIANA - 1988

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INTRODUCTION

The Plant Diagnostic Clinic in the Department of Botany and Plant Pathology at Purdue University is a service of the Cooperative Extension Service, Purdue Agricultural Experiment Station. Plant disease diagnosis and weed identification are gratuitous services offered by the clinic. Of the 1176 specimens received, approximately 85% were submitted by county extension agents. The remainder of samples came directly from commercial growers, homeowners, private consultants, and other interested persons. This paper is a summary of the major plant diseases and disorders which were diagnosed in the clinic and observed throughout the State in 1988. A number of reports exist which will allow this data to be compared with what has been encountered in the past (Evans, *et al.*, 1980; Evans-Ruhl, *et al.*, 1986, Pecknold, *et al.*, 1974; Ruhl, *et al.*, 1982-1986).

METHODS

Specimens are diagnosed visually or by culturing the pathogen on selected media. Some virus diseases are diagnosed by the leaf dip (negative stain) technique, utilizing the electron microscope. Serological rapid assay detection is also utilized. Once a disease or disorder is diagnosed, appropriate control measures are suggested. A summary of the samples diagnosed from January 1 through October 31, 1988 is given in Table 1.

RESULTS

As of October 31, 1988, the clinic had received 1176 samples, including agronomic, ornamental, fruit, turf, and vegetable crops (Table 1). Of these samples, approximately 37% were diagnosed as infectious disease problems, 27% were diagnosed as environmental/site disorders, 8% were diagnosed as chemical injury, and 4% exhibited a nutritional problem. The remaining samples were either damaged by insects, were poor samples, or lacked adequate information for a proper diagnosis. Drought and heat stress were diagnosed as the most common causes of poor growth and reduced yields in 1988.

SHADE AND ORNAMENTAL TREES

Diseases. The drought of 1988 resulted in fewer leaf diseases than in previous years. Apple scab of crabapples, anthracnose of sycamore and ash, rust on hawthorn and crabapples, and *Diplodia* tip blight of pine were almost nonexistent due to the extreme dry conditions. Ash trees infected with ash yellows showed no immediate effects from the drought. However, it is suspected that ash decline will intensify in 1989 due to the drought conditions. Bacterial leaf scorch of northern red oak, caused by a xylem-inhabiting bacteria (XIB), was confirmed from a 20

TABLE 1. Plant samples received in the Purdue Plant Diagnostic Clinic January 1 through October 31, 1988.

Number of Plant Specimen[1]	Samples	Diseases[2]	Dis-orders[3]	Chem.[4]	Nutr.[5]	Insect[6]	Other[7]
Agronomic							
Corn	99	16	47	32	17	10	11
Soybeans	164	103	15	42	9	30	21
Small Grain	64	53	11	2	2	0	10
Forage Grasses and Legumes	21	12	5	0	1	3	2
Ornamental							
Trees-Shade and Ornamental	264	40	127	5	5	57	63
Shrubs and Groundcover	98	38	43	4	2	11	20
Flowers	54	27	7	4	4	8	12
House Plants	15	6	5	0	1	3	2
Fruit							
Tree Fruit	47	22	15	0	0	8	3
Small Fruit	37	11	10	3	0	5	9
Vegetable	99	41	19	5	5	16	22
Turfgrass	55	61	13	0	0	3	5
Plant I.D.	159	-	-	-	-		
Total	1176	430	317	97	46	154	180

[1] The number of diagnosed problems add up to more than the number of samples received, since many samples may have more than one problem.

[2] Problems caused by an infectious disease causing agent; e.g., fungus, bacterium, virus, mycoplasma, or nematode.

[3] Problem caused by noninfectious environmental stress; e.g., wind, drought, heat, or soil compaction.

[4] Problem caused by herbicide/pesticide misuse.

[5] Problem caused by a nutrient imbalance.

[6] Problem caused by an insect. Does not include samples submitted to the Entomology Diagnostic Clinic.

[7] "Other" includes the causal agent categories no disease and inadequate sample for diagnosis (4 parasitic seed plants (dodder)).

year-old street tree in West Lafayette. Reports of XIB also causing leaf scorch of sycamore and elm in eastern and southern States suggests the same association may be present in Indiana.

Disorders. The drought of 1988 was the predominant disorder. The degree of drought stress to forest and landscape trees varied across the State. Generally, trees in the southern part of the State were in better condition than in the northern part of the State. Site location, tree vigor, and tree age were major factors in determining the degree of drought injury. Street trees in restricted growing sites were especially vulnerable to the drought and showed extensive dieback and leaf scorch. Drought caused 80% mortality to scotch pine seedlings in a number of Christmas tree plantings and slowed the growth of young pine plantings and deciduous nursery plantings. During late summer, there were numerous reports

from throughout the State of premature leaf yellowing and drop on tulip tree, maple, sycamore, and walnut. The full effects of drought damage will probably not be seen until the 1989 growing season. Further tree mortality and decline will occur through 1989 and beyond, as a result of the 1988 drought.

ORNAMENTALS

Diseases. There were no widespread diseases of major occurrence on ornamentals, in large part due to the extreme dry conditions. As in previous years, powdery mildew was prevalent during late summer on lilac, zinnia, dahlia, and numerous other susceptible hosts. A case of downy mildew on greenhouse-grown roses was also diagnosed.

Disorders. Drought injury was most common on shrubs in an already weakened condition and on newly planted ornamentals. Winter desiccation (browning) of junipers and other evergreens was common but not severe.

TREE FRUITS

Diseases. Apple scab, cedar apple rust, and other early season leaf and fruit diseases were of minor occurrence due to persistent dry weather throughout the growing season. Apple scab was the lightest its been in the last 15-20 years. Surprisingly, fire blight of pear and apple was reported from a number of orchards in southern and central Indiana. The majority of damage was due to blossom blight (especially common on late bloom) rather than the more common twig blight. Continued dry conditions through summer held most common summer diseases in check. However, rainfall in July and August resulted in moderate to light infection from sooty blotch and fly speck of apple fruit.

Disorders. The drought of 1988 resulted in smaller fruit size and further stress on already weakened trees. The full effects of drought damage will prpbably not be seen until after winter and into the 1989 growing season. The extent of damage was widely variable depending on orchard/tree location, the availability of irrigation, and the age of the trees.

SMALL FRUITS

Diseases. There were no outstanding infectious diseases reported on small fruit, no doubt in part due to the dry conditions. Typical fungal leaf spotting occurred on strawberries and brambles toward the end of the season.

Disorders. Where irrigation was lacking, the drought resulted in a high incidence of mortality to new plantings.

VEGETABLES

Diseases. Most of the diseases that normally plague commercial vegetable production in June and July caused little concern this year. There were isolated cases of bacterial speck on tomato (*Pseudomonas tomato*), black rot of cabbage (*Xanthomonas campestris*), *Alternaria* leaf blight of muskmelon (*Alternaria cucumerina*), and bean root rot (*Fusarium, Pythium, Rhizoctonia*). Non-irrigated growers did not have to try too hard to control those diseases this year, but it was business as usual for growers with irrigation! Late season diseases took their usual toll. Early blight (*Alternaria solani*) on potato was especially severe in some

fields. Gummy stem blight of melons (*Didymella bryoniae*) and black rot of squash and pumpkins threatened all cucurbits from August through September. Tomato anthracnose (*Collectotrichum coccodes*) and white mold on green beans (*Scerotinia sclerotiorum*) were widespread.

Virus diseases caused as much concern as any other vegetable crop disorder (except drought) in 1988. Watermelon Mosaic Virus (WMV) was diagnosed in all parts of the State on muskmelons, cucumbers, squash, and pumpkins. Incidence of WMV may have been unusually high this year, because many growers delayed planting as long as they could due to the dry spring. That allowed plenty of time for the virus to multiply within weed hosts and to be transmitted to cucurbits by aphids. The earlier the virus infects, the greater the damage to the crop. Some late pumpkins and cucumbers that were infected with WMV produced only a fraction of what they would normally yield. The virus is reported to be mechanically transmitted but is not carried in the seed.

A new virus was diagnosed on peppers for the first time in Indiana. The virus, tomato spotted wilt virus (TSWV), was identified in two commercial pepper fields in northern Indiana. This was the first time that TSWV was found on crops outside of the greenhouse in the Midwest. TSWV is transmitted by the Western Flower Thrips. It is not known to be seedborne in pepper or transmitted mechanically. Therefore, unless fields are continuously inhabited by the thrips vectors, disease incidence (percentage of infected plants) should not change over the season, although disease severity (the extent to which an individual plant is affected) is expected to increase. Many plant pathologists across the country are conducting research on TSWV to learn more about the nature of the virus and how to control it in our commercial fields.

Disorders. Two noninfectious disorders on tomato, blossom end rot and physiological leaf roll, were commonplace nuisances for homeowners.

AGRONOMIC CROPS

Diseases of Corn. The hot, dry weather conditions that persisted throughout Indiana during much of the growing season led to unusually high occurrences of *Fusarium* seedling blight, *Fusarium* stalk rot, *Fusarium* ear rot (all caused by *Aspergillus flavus*) in the State. These disease problems were general throughout the State but were more damaging in those areas that were most drought stressed. *Fusarium* seedling blight reduced stands in some fields but was more prevalent as a cause of uneven corn development and as a stalk rot later in the season. Common smut was the most prevalent in recent memory with as much as 25% of the ears infected in some fields.

A harvest survey was conducted by the Indiana State Chemist's Office for the presence of aflatoxin in the State. As of October 27, 1988, a total of 295 samples were analyzed. Of this total, 22 samples (7.5%) contained over 20 parts per billion (ppb) and 29 samples (17.3%) contained under 20 ppb aflatoxin (primarily B*1*). Aflatoxin production was found in samples scattered over the State but was more prevalent in the western half and most prevalent in the northwestern and southwestern regions. Concentrations of aflatoxin appeared to be higher in the western half than the eastern half of the State. The highest concentration of aflatoxin in the harvest survey was 129 ppb. One sample submitted to the Plant Diagnostic

Clinic by a Morgan County grower with severely drought stressed corn was found to contain 505 ppb aflatoxin.

In addition to *Fusarium* stalk rot, anthracnose stalk rot (*Colletotrichum graminicola*) was a common occurrence. Diplodia stalk rot (*Stenocarpella maydis*) and charcoal stalk rot (*Macrophomina phaseolina*) occurred in portions of southern Indiana. As in 1987, Diplodia ear rot (*S. maydis*) caused significant losses in 1988 in some southern Indiana fields where corn followed corn with reduced tillage practices.

There were no known yield losses in 1988 due to foliar diseases of corn. However, late in the season, minor amounts of northern corn leaf blight (*Exserohilum turcicum*), southern corn leaf blight (*Bipolaris maydis*), northern corn leaf spot (*Cochliobolus carbonum*), grey leaf spot (*Cercospora zeae-maydis*), and common rust (*Puccinia sorghi*) were observed.

Disorders of Corn. Drought and heat stress related factors were the most common abiotic causes associated with poor growth, delayed tassel development, poor pollenation, and severely reduced yields.

Diseases of Soybeans. Charcoal root rot (*Macrophomina phaseolina*) was more widespread and damaging in Indiana in 1988 than in any previous recorded year. The disease was observed in most areas the State at all stages of plant growth from seedlings to maturity and caused significant yield losses in some fields.

The soybean cyst nematode (SCN; *Heterodera glycines*) continued to increase in prevalence and severity in the western half of the State. SCN is the most significant problem affecting soybean production in those areas of the State where the nematode populations are high enough to cause economic damage. Both SCN and charcoal root rot are exacerbated by drought conditions.

Rhizoctonia root rot (*Rhizoctonia solani*) was found in many areas of the State but was easily confused with charcoal root rot, especially early in the growing season. Sudden death syndrome (SDS; *Fusarium solani* race A suspected) was observed primarily in southwestern Indiana again in 1988, but disease severity was light except in a few isolated fields. SDS was also identified in a single field in White County, but damage was very light. The geographic range of SDS in Indiana in 1988 was similar to that in 1987.

Brown spot (*Septoria glycines*) developed at mid-season in a few east-central Indiana fields and in other areas of the State later in the season. Damage was minimal. Other foliar and stem diseases, such as bacterial blight, downy mildew, and stem canker, occurred infrequently and at very low levels.

Pod and stem blight (*Diaporthe/Phomopsis* spp.) and Purple seed stain (*Cercospora kikuchii*) seed infections were observed in scattered areas of the State. However, the most significant seed problem in the State was the shriveled, discolored seed which resulted from drought and temperature conditions.

Disorders of Soybeans. Hilum bleeding or splotching (a discoloration of the seed coat which emanates from the hilum, diffuses away from the hilum, and has the same color as the hilum) was observed in several scattered areas of the State. Hilum bleeding is often associated with soybean mosaic virus (SMV) infection; however, both ELISA and grow out tests with affected seed failed to indicate the presence of SMV. Observations indicated that affected seed came from plants with

heavy bean leaf beetle feeding on the pods. The etilogy of this discoloration remains unknown at this time.

Splitting of green pods at the pod suture about the R_6 was observed primarily in the middle third of the State. First reports of this disorder were received from east-central Indiana. Within several days, the condition had been reported from several areas extending to the western portion of the State. Observations indicated that plants affected by drought and with heavy spider mite infestation were the most likely to exhibit pod splitting. We currently believe that the abnormal pod splitting was the result of a combination of environmental stresses and spider mite feeding, affecting the water relations of affected plants.

Leaf rugosity, similar to that produced by hormone type herbicides, was a common complaint in many areas of the State around mid-season. While some complaints were judged to be the result of herbicide drift or volatilization, several complaints were not diagnosed. ELISA tests for soybean mosaic virus were negative.

Drought and heat stress were the most common causes of abiotic factors associated with poor growth and reduced yields.

Diseases of Wheat. Wheat spindle streak mosaic virus (WSSMV) symptoms were evident in many wheat fields in the State in early spring; however, field losses were minimal. Barley yellow dwarf virus (BYDV) was probably the most widely distributed disease of wheat and other small grains in the State. Yield losses undoubtedly occurred, but field losses due to drought and high temperatures precluded any yield loss estimates due to BYDV. Wheat streak mosaic virus (WSMV) was identified by ELISA tests from southwestern Indiana. *Rhizoctonia* leafspot on winter wheat was prevalent on wheat which was planted too deeply.

Disorders of Wheat. While several common foliar disease pathogens were present in wheat fields throughout the State in early spring, the excessively dry weather during the growing season precluded any of these pathogens from developing to significant levels. In general, wheat was free from disease in 1988, except for the virus diseases discussed above.

Diseases of Alfalfa. Alfalfa was relatively free from significant infectious diseases in 1988. Crown root-rot complex (a complex of pathogens) was exacerbated by the hot, dry growing conditions prevalent in the State in 1988.

TURFGRASSES

Kentucky bluegrass (*Poa pratensis*). Helminthosporium leaf spot (*Drechslera poae*) was present throughout the State but was not damaging due to the hot, dry weather. Necrotic ring spot (*Leptosphaeria korrae*), summer patch (*Magnaporthe poae*), and brown patch (*Rhizoctonia solani*) were common and damaging diseases in many areas of the State. In many cases, it was impossible to separate the effects of these patch diseases and the effects of drought as the cause of plant death.

Bentgrasses (*Agrostis palustris*). Brown patch (*R. solani*) wasthe most prevalent disease in the State. Where left untreated (without a fungicide), this disease became severe. Dollar spot (*Lanzia* or *Moellerodiscus* spp.) occurred in late season. Most bentgrass problems in the State were the result of severe stresses due to

low mowing height and drought. *Pythium* blight (*Pythium aphanidermatum*) was a minor problem on some golf course greens and tees.

Annual bluegrass (*Poa annua*). Anthracnose (*Colletotrichum graminicola*) was severe during the extremely hot conditions in August; however, it was impossible to separate the effects of this disease and the severe environmental stresses caused by the drought.

Ryegrass (*Lolium perenne*). *Pythium* blight (*P. aphanidermatum*) was damaging in a few home lawn and golf course fairways in August.

Fescue (*Festuca* spp.). Red thread (*Laetisaria fuciformis*) was observed causing problems in a few home lawns.

Numerous turf areas suffered extensively from the extreme temperatures and drought conditions prevalent throughout the State.

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