# A Compilation of Plant Diseases and Disorders in Indiana—1984

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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. The clinic provides a free service to interested persons through the county extension system for accurate identification of weeds, plant diseases and plant disorders. This paper is a summary of the major plant diseases and disorders which were diagnosed in the clinic and observed throughout the state in 1984.

## Methods

Plant specimens are submitted to the Plant Diagnostic Clinic from county extension agents, homeowners, growers, nursery operators, consultants, and others. 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. Once a disease or disorder is diagnosed, appropriate control measures are suggested. A summary of the samples diagnosed from January 1 through Nov. 26, 1984 is given in Table 1.

## Results

The incidence and severity of infectious diseases were greatly influenced by extremes in environmental conditions in 1984. Weather and site-related problems were commonplace. The severe cold temperatures of December, 1983, in conjunction with a lack of snow cover caused widespread death or injury to both agronomic and ornamental crops.

## Shade and Ornamental Trees

*Diseases:* Ash anthracnose was exceptionally severe in the southern areas of the state, resulting in heavy defoliation during May and early June. Anthracnose on sycamore, white oak and maple was also severe. Sycamores especially showed extensive dieback and twig infection. Apple scab was the most common disease on crabapples, causing extensive leap drop throughout the summer. Rust diseases in general were severe, especially cedar quince rust on hawthorn.

*Disorders:* The severe cold in December in conjunction with a lack of snow cover caused widespread death or injury to both landscape trees and nursery seedlings. The sudden freezing caused extensive damage at the Vallonia State Nursery. Especially hard hit were black walnut, white, black, English and cherrybark oaks, tulip, ash, and Chinese chestnut seedlings. Established landscape trees most severely damaged were sweetgum, ornamental cherry, and purple leaf plum. The northern third of Indiana experienced severe winter burn to conifers and broadleaved evergreens. White oak "tatters," a newly discovered disorder of white oak, was very prevalent in the northern half of the state. The exact cause of this disorder is not yet known. Tree decline and leaf scorch were the most predominant problems during the summer.

TABLE 1. Plant samples received in the Purdue Plant Diagnostic Clinic Jan. 1 through Nov. 26, 1984.

| Plant Speciman | Number of Samples | Diseases[a] | Disorders[b] | Chemical[c] | Nutritional[d] |
|---|---|---|---|---|---|
| AGRONOMIC | | | | | |
| Corn | 95 | 36 | 31 | 13 | 9 |
| Soybeans | 101 | 81 | 9 | 5 | |
| Small Grain | 28 | 19 | 6 | 2 | 4 |
| Forage Grasses and Legumes | 31 | 25 | 4 | 1 | 2 |
| ORNAMENTAL | | | | | |
| Trees-Shade and Ornamental | 332 | 114 | 181 | 14 | 5 |
| Shrubs and Groundcover | 79 | 12 | 54 | 5 | 1 |
| Flowers | 50 | 30 | 9 | 3 | 4 |
| House plants | 13 | 7 | 3 | 0 | 0 |
| FRUIT | | | | | |
| Tree Fruit | 62 | 26 | 27 | 1 | 2 |
| Small Fruit | 41 | 13 | 21 | 4 | 0 |
| VEGETABLE | 100 | 47 | 22 | 13 | 5 |
| TURFGRASS | 45 | 25 | 20 | 1 | 1 |
| PLANT IDENTIFICATION | 167 | — | — | — | — |
| FORWARDED TO ENTOMOLOGY | 64 | — | — | — | — |
| TOTAL | 1208 | 435 | 387 | 79 | 38 |

[a] Problems caused by an infectious disease causing agent, e.g. fungus, bacterium, virus, mycoplasma, nematode.
[b] Problem caused by noninfectious environmental stress, e.g. wind, drought, heat, soil compaction.
[c] Problem caused by herbicide/pesticide misuse.
[d] Problem caused by a nutrient imbalance.

## Ornamentals

*Diseases:* Powdery mildew was the most frequently recorded disease of shrubs and flowers. Those plants most frequently recorded with powdery mildew infections were lilac, rose, euonymus, and zinnia. Crown gall on euonymus was very noticeable during the early spring period.

*Disorders:* Injury from the severe December cold was most noticeable on cotoneaster, euonymus, pyracantha, holly, rhododendron and barberry. However, many other ornamentals also showed cold damage. The extent of cold injury varied, depending on plant age, location and vigor. Symptoms associated with cold injury were complete plant death, delayed leafing out, sudden wilt and dieback of new growth, as well as severe cracking of young exposed tissue.

## Tree Fruits

*Diseases:* Heavy rainfall in late April and May resulted in outbreaks of apple scab in a number of commercial apple orchards. Cedar apple rust was also prevalent. Of interest was the very light amount of fire blight. This usually widespread disease was only noted in a few orchards in the northern part of Indiana during late June. The

most noticeable disease on peaches and nectarines was bacterial leafspot, which caused mild to moderate leaf injury in isolated orchards. Peach leaf curl and plum pockets on both peach and nectarine were common during mid and late spring.

*Disorders:* The extreme cold killed fruit buds of many stone fruits. Peach and nectarine were especially damaged. Only the southernmost part of the state yielded a peach or nectarine crop. In addition to cold injury on fruit buds, there was extensive cold damage to stem tissue of all tree fruits, most noticeably stone fruits. Many peach trees were killed or showed extensive limb death. Cold injury to the roots of various apple root stocks, especially E.M. 7, was noted in a number of orchards in the southern portion of the state. Damage was most severe on exposed sites which had no snow cover during December.

### Small Fruits

*Diseases:* Strawberries were the most frequently submitted of the small fruit specimens. However, no major infectious diseases were recorded on strawberries during the growing season. Various leaf spots, Botrytis fruit rot and black root rot were common diseases on samples submitted to the clinic. Raspberry anthracnose and other cane infecting diseases were frequently observed on brambles.

*Disorders:* Cold injury to roots and the root-crown area was the most prevalent disorder of strawberries and raspberries. Such injury resulted in extensive losses to many commercial growers. Entire fields were killed in certain areas of the state.

### Turfgrass

*Diseases:* In general, weather conditions were good for turfgrass growth and development during 1984. Disease problems were relatively minor and scattered except for early spring when wet, cool weather was favorable for development of the Helminthosporium leaf blight and melting out complex.
*Disorders*: Excessive thatch accumulation continues to be a major cause of turfgrass problems in home laws.

### Vegetables

Hot, dry weather in early June may be responsible for the relatively low levels of foliage diseases throughout the weeks of summer. Moderate or severe epidemics of foliar vegetable diseases did not occur until late August and mid September, when cool nights were accompanied by heavy dews. Significant disease problems were observed on vegetable seedlings, cucurbits, tomatoes, and crucifers.

*Seedling diseases:* Damping-off, caused by *Pythium* spp., was diagnosed in muskmelon and watermelon seedbeds. Most seedbeds showed less than 1% damping-off. However, at two locations farmers lost more than 30% of their seedlings to damping-off. Pepper seedbeds were again plagued by *Rhizoctonia* spp., which caused a wirestem symptom and death of young seedlings. The problem occurred mostly in outdoor seedbeds, but occasional problems were observed among greenhouse grown seedlings.

*Cucurbit diseases:* The usual melon foliar blights, powdery mildew and Alternaria leaf blight, were established late in the season and, therefore, resulted in little or no yield loss. An epidemic of downy mildew developed in the melon crop in southwestern Indiana during mid September. The disease was established too late to cause significant economic loss.

A malady associated with environmental stress (nutrient imbalance, acid soil, and air pollution) occurred on a significant number of melon farms in 1984. The problem

was diagnosed in south-central Indiana (Jackson County) for the first time.

Incidence of bacterial wilt was reduced from levels observed in previous years. Presumably registration and widespread application of a soil-incorporated insecticide is responsible for reduced levels of bacterial wilt.

Fusarium wilt was severe in southwestern Indiana wherever growers planted wilt susceptible cultivars. 'Superstar,' a Fusarium wilt resistant muskmelon cultivar that accounted for less than 5% of the acreage in 1982, was estimated to occupy more than 60% of the land planted to muskmelons. Fusarium wilt remained a mild problem on watermelons because growers have been using cultivars that are more resistant.

*Tomato disease:* Widespread, serious epidemics of major tomato fruit and foliage diseases did not develop in 1984. Low incidences of anthracnose, bacterial speck, bacterial spot, early blight, gray leaf spot, and Septoria leafspot were observed in many fields. Bacterial canker caused severe or near total losses of fresh market and processing tomatoes at a variety of locations throughout the state. Until the seed sources can be accurately assayed and indexed for presence of the bacterial canker organism, this disease will continue to be a significant threat to tomato production.

Sclerotinia stem rot was responsible for the near total loss of a field in central Indiana. The distribution of *Sclerotinia* infected plants normally is very clustered and incidence usually is less than 0.01%. Patterns in the field and field history suggested that the organism was introduced by transplants obtained from other states. The presence of this disease may present long-term problems because the pathogen will remain indefinitely in northern soils and also may depress soybean yields.

*Crucifer diseases:* Black rot of cabbage was observed on the most susceptible varieties in northwestern Indiana. Downy mildew of cabbage, cauliflower, and broccoli was observed in commercial fields in mid-September.

## Agronomic Crops

*Disease - Wheat:* Extremely cold temperatures in December, 1983, coupled with no snow cover resulted in considerable winter kill in the southern half of Indiana. Wheat in the northern half of the state was protected by adequate snow cover, and only minor winter kill was observed. Rhizoctonia spring blight was prevalent, primarily in southern Indiana, and this disease coupled with winter kill resulted in poor stands in many fields. The cool, wet spring was favorable for the development of Septoria leaf blotch and some powdery mildew. Dry June conditions, however, kept these diseases from developing to major yield-reducing proportions. Leaf rust developed throughout the state and to severe levels in some fields. However, the disease developed late in the growing season and yield losses were estimated to be small. Take-all was severe in some scattered fields but was not a significant problem in most fields. While a few fields were sparsely affected with either wheat spindle streak mosaic or barley yellow dwarf virus, both of these diseases were minor and considerably less prevalent than during the 1983 growing season. A few fields were affected with bunt. Bunt appeared to be primarily in individual fields in the north-central and north-eastern part of the state.

*Diseases - Corn:* Cool, wet weather delayed corn planting in many fields. Those fields that were planted in late April and early May were subjected to heavy rainfall. As a result, portions of many of these fields were flooded for brief periods of time, and crazy top (*Sclerophthora macrospora*), developed in small scattered areas of many of these fields throughout the state. Overall, however, this disease caused only minor yield losses. Foliar diseases were at low levels throughout the growing season. Minor field infections by the organisms that cause the leaf blight phase of Stewart's disease, southern corn leaf blight, holcus spot, northern corn leaf blight and northern corn

leaf spot were observed. Common corn smut was noted throughout the state, but yield losses were minor. Stalk rots were prevalent in most fields, with some fields having 50% or more of the plants affected. Gibberella and Fusarium stalk rots were most common with moderate amounts of anthracnose stalk rot. Fusarium ear rot was the most common corn disease, however not severe enough to cause significant yield loss. Only rare, light occurrences of Gibberella ear rot were observed.

*Disorders - Corn:* Hot, dry conditions coupled with several days of continuous high winds dried out the upper soil surfaces of many corn fields when plants were starting to develop the crown root system. These environmental conditions were incompatible with the proper development of the crown root system, and a condition called floppy corn developed in widespread areas of the state. Cultivation and/or timely rainfall alleviated the condition in most fields.

A condition of unknown etiology occurred for the first known time in several southern Indiana fields. A wide range of symptoms were associated with this disorder. Abnormal plant growth was first observed when corn plants were in the 4th to 5th leaf stage. The symptoms were stunted, chlorotic plants with portions of new leaves emerging from the whorl that were translucent and dead or dying. This tissue death gave plant leaves a "shot-hole" or "cut-leaf" appearance. The initial symptoms were rapidly followed by leaf trapping and twisting which produced a downward curvature of plant tops. Multiple suckers developed in many affected plants. In severely affected fields, varying numbers of these plants died (as high as 50%). Later symptoms were stunted to spindly single to multiple plants or highly deformed, severely stunted plants with extremely shortened internodes. Split stalks and deformed leaves were commonly found on the shorter plants. As affected plants reached the reproductive stage, tassels were either absent, did not emerge because of leaf trapping, or, in some cases, emerged normally. Ear shoot development was variable from none to a single ear shoot at each of several nodes. Also in many plants, ear shoot development occurred at the top of the plants where the tassel normally develops. Sometimes only ear shoots appeared at the tassel's location, while in other cases a combination of ear shoots and tassels developed. When ears developed, regardless of location on the plant, they were small, poorly pollinated and had a definite curvature. One of the most striking symptoms was the development of the ear at the top of the plant. Other symptoms noted on some plants were abnormally long silks and abnormally long, multiple husks that gave ears a feather duster appearance.

The disorder was at first thought to be associated only with no-till corn in PIK ground with a heavy sweet clover residue. However, the condition was later found in other tillage systems and with different plant residues. However, the condition was more severe and more prevalent in no-till systems. One severely affected field was no-till corn into wheat stubble. The condition was observed across several hybrids and herbicide treatments. Purdue entomologists could find no consistent evidence of insect injury in the affected fields. Purdue, Kentucky, and Illinois plant pathologists could find no evidence of a plant pathogen in or on the affected plants that is known to cause similar abnormalities. Some of the symptoms exhibited by affected plants were similar to symptoms of the downy mildew disease known as crazy top, but oospores of the causal agent could not be found. With crazy top, these oospores are readily found in diseased tissue.

The only consistent factors found in all affected fields were that the planter opening did not close in no-till, or planting was very shallow with some exposed seed in other tillage systems. Also, planting dates between May 15 and June 1 and wet soil conditions seemed to be consistent. In nearly every instance (with only 1 known exception), heavy rainfall occurred within a day to a few days after planting.

It is possible that the abnormal development was due to a hormone imbalance within the plant, but no one has yet secured evidence as to what caused the imbalance. The general consensus of opinion at Purdue is that the cause was probably a combination of factors rather than a single causal agent. The causal agent or agents is or are probably exceedingly rare, as this was the first time anyone recalls seeing the problem. Further laboratory and greenhouse experiments are being conducted.

*Diseases - Soybean:* Pythium and Phytophthora seedling blights were common in fields planted before mid-May. Rhizoctonia root rot was common and occasionally severe in many fields. Phytophthora occurred in some fields, but it was not severe. Bacterial blight, downy mildew, and brown spot were common foliar diseases, but their severity was not sufficient to cause significant yield reductions. The most damaging soybean diseases were caused by soil-borne pathogens and did not become evident until mid-season or later. Brown stem rot was more prevalent and damaging than in recent years. Charcoal root rot was prevalent in southern Indiana and damaging in several fields. The soybean cyst nematode was identified in additional fields, especially in the northwestern part of the state, and Sclerotinia stem rot caused yield losses in some central Indiana fields.

*Diseases - Alfalfa:* Foliar diseases were prevalent throughout the state before the first cutting. Sclerotinia crown and stem rot was observed in several fields. This disease was especially damaging in a few fall seeded fields. The crown, root rot complex was responsible for killing patches of plants in some fields. Rust developed severely in a few stressed fields late in the season.