

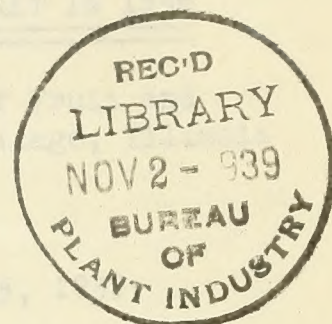
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Fruit and Vegetable Diseases on the Chicago Market
in 1938.

September 15, 1939.



BUREAU OF PLANT INDUSTRY

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FRUIT AND VEGETABLE DISEASES ON THE CHICAGO MARKET IN 1938

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As in years past, these data were compiled from notes made on inspections of fresh fruits and vegetables as they arrived on South Water Market and at freight and express terminals, and from material abstracted from federal inspections certificates issued by the Bureau of Agricultural Economics in Chicago. The most important common diseases are listed as a matter of general information. Several unusual diseases observed on this market for the first time are also described. These diseases are phytophthora rot of California asparagus; waxy breakdown of California garlic; smudge and black rot of Texas Crystal Wax onions, and gray mold rot of California potatoes. Some field and market notes on the fall crop of California tomatoes are appended.

APPLES:

Blue mold rot (Penicillium expansum) as usual, was the most common cause of decay in apples from all regions. In the better grades of apples it is seldom that as much as 3 percent of blue mold rot is found, but in poorer grades it is not uncommon to find 5 to 15 percent and sometimes it ranges to as high as 50 percent. For example, a car of Idaho Winesaps in baskets was received in February which showed blue mold rot ranging from 15 to 55 percent, the average for the load being 30 percent.

Bitter rot (Glomerella cingulata) was observed on only one or two lots of Greenings received from Virginia in August. This decay ranged from 2 to 8 percent with an average of approximately 4 percent, mostly in the early stages of development.

Brown rot (Sclerotinia fructicola) is not commonly found affecting apples on the market, but this year it occurred in some Willow Twig apples from Missouri received the latter part of May. Four percent of the stock was affected with brown rot and there was also some slight decay caused by Alternaria.

Gray mold rot (Botrytis cinerea) was observed ranging from 2 to 10 percent in a car of Washington Winesaps received in June and a car of Rome Beauty also showed this decay ranging from 4 to 16 percent.

Bullseye rot (Gloeosporium perennans) was found affecting 10 percent of a lot of Washington Winesaps marketed in July.

An unusual amount of Jonathan spot was found in a few cars of Washington fruit received in June. In one car in particular this blemish ranged from 15 to 70 percent, an average of about 45 percent of the fruit showed numerous small spots sometimes covering 40 percent of the surface of the fruit.

Pink mold rot (Cephalothecium roseum) following scab was noted affecting 1 to 2 percent of Greenings from New York in October.

Scald (non-parasitic) was not found affecting many apples seriously except in an occasional lot of Greening from New York, and Rome Beauty from West Virginia.

ARTICHOKES:

Only a few lots of globe artichokes from California were observed to show an appreciable amount of gray mold rot (Botrytis cinerea). One of the most serious marketing factors was discoloration of the outer scales due to rough handling. While the buds are under refrigeration and kept crisp there is not much discoloration apparent in bruised areas, but as soon as the buds become warm and the tissues begin to shrivel due to loss of water then the brownish-black discoloration becomes an objectionable feature.

ASPARAGUS:

Except for local stock most of the asparagus received on this market arrives during April and May from California. Most of this stock arrives in good condition, but occasionally cars show considerable decay, usually caused by bacteria of the soft rot type. Several cars inspected during the latter part of April and the first part of May showed bacterial soft rot ranging from 3 up to as high as 45 percent in some crates. The average for many lots was about 15 percent.

Fusarium species were evident as a mold on the tips of some lots of asparagus received from California in October. The most seriously diseased lot noted showed an average of 40 percent with moldy tips.

An unusual decay induced by a species of Phytophthora developed in asparagus shipped from excessively wet fields in California during March and April. Many lots showed this decay ranging from 10 to 30 percent. The spears were generally affected about an inch or two above the base. The decaying tissues were watery, soft, and slightly brown in color. Oospores were abundant in the grayish scum-like surface mold and in the broken down tissues.

BEANS:

Bacterial blight (Bacterium phaseoli) was found affecting 3 to 4 percent of the stock received from Florida, Illinois, and Arkansas in June.

Soil rot (Rhizoctonia) caused a great deal of damage to beans from Florida and Louisiana marketed in October. In a few cars over half of the stock in some hampers showed this decay. The average for the worst carlot noted was 12 percent.

Watery soft rot (Sclerotinia sclerotiorum) also caused considerable damage in some shipments of green beans from Florida and Louisiana.

CABBAGE:

Bacterial soft rot (Bacterium spp.) continues to be the most serious and the most common disease of cabbage on the market. While this decay usually affects only the outer leaves, it also occasionally becomes serious as a stump rot. In one lot of Missouri cabbage received in June 60 percent of the heads were infected. The decay was mostly at the butts and penetrated sometimes to a depth of one inch or more. This lot, of course, can not be considered typical, for it was loaded in bulk, the heads being approximately 5 feet deep in the car, and was shipped under ventilation. At the time of inspection the temperature of the cabbage at the bottom of the load was 75° and at the top of the load 89°F.

Black leaf speck (non-parasitic) seriously blemished some of the California stock received in February. One lot on inspection showed an average of 40 percent of the heads affected. This blemish is often very objectionable when the specks occur on the inner leaves of the head.

CANTALOUPE:

Cantaloups received on this market were usually not seriously affected by decay. Some lots showed softening and withering and a few cars received in July showed 4 to 5 percent of the fruits affected with bacterial soft rot (Bacterium spp.). An occasional melon showed fusarium rot (Fusarium spp.) affecting the stem end.

CARROTS:

An unusual amount of watery soft rot (Sclerotinia sclerotiorum) was found on carrots on the market this season. Stock shipped from Texas during the middle of May showed a range of from 8 to 30 percent affected with this disease. The average for several cars was about 12 percent. Some California carrots received in October also showed 5 to 10 percent of watery soft rot.

One of the most serious market factors involving carrots was

bacterial soft rot (Bacterium spp.) in the tops. Several cars of Texas carrots received in March showed dirty tops with bacterial soft rot ranging sometimes as high as 50 percent.

CAULIFLOWER:

Bacterial soft rot (Bacterium spp.) caused considerable decay in several shipments received from California and New York. In California shipments received in March it often averaged around 6 percent. New York shipments received during October and November often showed as high as 25 percent of the heads affected with soft rot.

One car of New York stock showed approximately 50 percent of the heads affected with early stages of gray mold rot (Botrytis cinerea).

CELERY:

Blackheart occurred in small amounts in several shipments of Florida celery received in February, March, and April. The most seriously affected lot showed black-heart ranging from 12 to 50 percent, with an average of 30 percent.

Watery soft rot (Sclerotinia sclerotiorum) was rather serious in some of the California celery in April and May. A few shipments received here had as much as 75 percent of the stock affected.

CHICORY:

Shipments of curly endive or chicory received from California during February and March often showed considerable decay by bacterial soft rot (Bacterium spp.). However, one of the most serious marketing factors was a reddish-brown discoloration found in the heart leaves of a great many bunches. No organism is associated with this discoloration and it does not show in the field, hence it appears that it is due to some physiological disturbance at harvesting time or during refrigeration and transit.

CUCUMBERS:

Bacterial spot (Bacterium lachrymans) damaged many lots of cucumbers from Florida, Alabama, and South Carolina. This disease was especially prominent in South Carolina stock shipped in June when some cars had from 4 to 90 percent of the stock affected, the average for many being close to 25 percent.

Cottony leak (Pythium aphanidermatum) was found in small percentages in stock from both Florida and Alabama.

The most serious anthracnose (Colletotrichum lagenarium) found was in shipments received from Maryland in July. Several baskets of this stock inspected in a store showed an average of 40 percent seriously blemished.

Although most green-house stock is free from decay, withered ends occasionally detract greatly from the market value. A lot of cucumbers received from Washington in October showed an average of 60 percent with spongy and shriveled blossom ends involving almost one-fourth the length of the fruits.

Some Texas cucumbers received in May showed yellowish-brown lesions 1 to 2 centimeters in diameter, sometimes with green mold over the central region. The affected tissues were tough and spongy. Cavities filled with mold were common. A species of Alternaria was isolated from such lesions. Alternaria has been found affecting cucumbers on the market, but heretofore it has seemed to be secondary, following other diseases and injuries. In this instance, however, it seemed to be the inciting agent in the development of this yellowish-brown spongy rot.

DEWBERRIES:

Not many dewberries are inspected on this market. However, one shipment received by truck from North Carolina in May was found to have gray mold rot (Botrytis cinerea) affecting from 25 to 90 percent of the berries in some boxes, the average for the load being 50 percent.

GARLIC:

The most serious decay usually found in garlic on the market is blue mold rot (Penicillium spp.). In some lots inspected this decay averaged about 3 percent.

A yellow waxy breakdown of the outer cloves of bulbs from several lots proved more or less serious in California stock. These amber waxy cloves do not go into a soft decay, but eventually become dry and hard. No organism appears to be associated with this trouble. It has been suggested that high temperatures and possibly sunscald cause it.

GRAPES:

Gray mold (Botrytis cinerea) and blue mold (Penicillium) cause most of the decay in grapes on the market. In table grapes these diseases are usually not serious, but in wine grapes some lots were found to show as high as 90 percent infected.

Some grapes examined in February that were packed in sawdust containing sodium bisulphite showed considerable injury by this chemical.

GRAPEFRUIT:

Most of the serious decay in grapefruit was caused by blue mold (Penicillium italicum). While this decay ranged as high as 20 percent in some boxes, in a few cars, the average generally was close to 4 percent. This was especially true in the Texas stock received during January, February, and March. Shipments received later sometimes showed a higher percentage and these also showed a small amount of stem-end rot (Phomopsis).

LEMONS:

Green mold rot (Penicillium digitatum) affected 3 percent of the lemons in one car of California stock received in May. This car also showed 1 percent of brown rot (Phytophthora citrophthora).

Alternaria rot (Alternaria spp.) in advanced stage associated with blue mold rot affected an average of 20 percent of the lemons received in a shipment from Texas in September.

LETTUCE:

Many shipments of lettuce received from Arizona and California showed bacterial soft rot (Bacterium spp.) in the outer leaves ranging from 2 to 25 percent. In California stock some of this decay was following tip burn (non-parasitic). Some cars of lettuce showed as much as 50 percent of the heads affected with tip burn.

Downy mildew (Bremia lactucae) occurred in a few shipments of California stock received in April. Generally this disease affected 2 to 4 of the outer wrapper leaves, but since these are trimmed off there is usually little loss on account of this trouble.

A few shipments of California lettuce examined in September showed heads with internal brown spots, streaks, and yellowish areas indicating the presence of brown blight or spotted wilt.

ONIONS:

Gray mold rot (Botrytis spp.) was by far the most serious onion trouble on this market. The decay was prevalent in stock from Colorado, Idaho, Utah, Washington, California, Texas, and Wisconsin. A great many of the cars showed an average of 10 percent of this decay.

An unusual type of smudge or black spot was found on Crystal Wax onions from Texas in June. In one lot 25 percent showed black or grayish outer scales about the upper half of the bulbs. In many the fleshy scales about the neck were black. Definite black pycnidia were found on the discolored necks of several bulbs. An unidentified species of Diplodia was consistently isolated from these onions.

ORANGES:

Probably the most serious marketing factor in oranges was skin breakdown characterized by pits and discolorations and shriveling about the stem ends of the fruit. Only in occasional lots of Florida stock was real stem end rot (Phomopsis) found.

Blue mold rot (Penicillium italicum) was present in many shipments from Florida and California, but generally ranged below 5 percent as an average.

PEACHES:

Brown rot (Sclerotinia fructicola) caused considerable decay in peaches from Arkansas, California, Georgia, and Illinois. This decay frequently averaged around 25 percent and sometimes some baskets showed as much as 80 percent decay. More brown rot was found in California peaches than has been noted for a number of years. In August some carlots had 12 to 60 percent, averaging 35 percent.

Rhizopus (Rhizopus nigricans) caused considerable decay in the fruit in the top layer baskets of some cars. It was generally present along with brown rot.

Colorado peaches received in September sometimes showed 15 percent of pustular spot (Coryneum beijerinckii).

PEARS:

Gray mold rot (Botrytis spp.) occurred in small percentages in a few lots of Oregon pears. This type of decay does not seem to be as common as in years past.

Brown rot (Sclerotinia cinerea) was found in only one truckload of Michigan stock received in September, affecting about 6 percent of the load.

Oregon pears in storage in May showed numerous brownish black circular spots, 1/4 to 1/2 inch in diameter, caused by a species of Cladosporium.

PEAS:

Gray mold rot (Botrytis spp.) caused more actual decay in peas than any other organism on this market. It was found in stock from California and Colorado. Usually less than 5 percent was noted, but in one lot received from Colorado in September 60 percent of the pods were affected with gray mold and watery soft rot (Sclerotinia sclerotiorum). As is common in other vegetable groups, these two diseases are frequently associated.

Of the defects noted, mosaic (virus) and scab (Cladosporium pisicola) were the most important, although pod spot (Ascochyta pisi) blemished some lots of California stock in April.

PEPPERS:

Rhizopus soft rot (Rhizopus nigricans) caused more decay of peppers on the market than any other organism. In some lots from 4 to 30 percent of the stock was affected. A lot of Georgia pimentos that were red ripe on arrival in April showed as much as 30 percent in some containers.

Bacterial spot (Bacterium vesicatorium) occurred in Florida peppers, but this blemish usually was not of sufficient importance to reduce the market value of the stock.

POTATOES:

Gray mold rot (Botrytis spp.) of potatoes on the market was found for the first time this year. Two carlots of California potatoes that arrived in January showed an average of 14 percent gray mold rot about half of which was in advanced stages. This rot was grayish-brown and watery, sometimes involving over half of the tuber. In advanced cases the characteristic surface mold bearing conidia was prominent and in a few instances sclerotia were present. Isolations made from a number of tubers gave pure cultures of Botrytis. Inoculation tests have proved the pathogenicity of the organism recovered.

Bacterial soft rot (Bacterium spp.) occurred in many lots of new potatoes that had been washed and not thoroughly dried before loading for shipment. Generally speaking, however, stock from Florida, Alabama, Louisiana, and Texas is fairly well dried before packing; consequently the decay often does not run over 3 to 5 percent, with occasional lots running as high as 20 percent.

Sclerotium (Sclerotium rolfsii) occurred in small amounts in stock from Louisiana, Alabama and Arkansas.

Late blight tuber rot (Phytophthora infestans) affected 40 percent of the potatoes in a car of North Carolina stock received in June. Most of the other late blight found on the market came from Wisconsin in the October shipments, the decay sometimes ranging to as high as 20 to 30 percent.

California potatoes received in May and June often showed considerable brown discoloration at the bud end of the long White Rose potatoes shipped from the Shafter area. These tubers are especially tender at the bud end and are practically always scuffed, and somewhat discolored, especially if they have been exposed to hot winds for any length of time. In some instances there was an appreciable percentage of scald in this stock, and as usual, bacterial soft rot followed causing a sticky foul smelling decay.

SWEET POTATOES:

Rhizopus soft rot (Rhizopus spp.) was about the only disease that caused serious trouble on this market. The Louisiana and Tennessee stock received here frequently showed up to 20 percent decay; the average was about 10 percent.

TOMATOES:

It was the writer's privilege to spend two weeks studying California tomato diseases in the fields and packing houses during the last of October. Instead of listing the diseases as in years past, it was thought that possibly many readers would be more interested in the field and market notes on California tomatoes which were compiled for the use of the Federal Inspection Service. These notes are given below.

WATERMELON:

There was a little more anthracnose (Colletotrichum lagenarium) and stem-end rot (Diplodia spp.) received on this market than has occurred in years past. The Florida stock received in May often had 3 percent stem-end rot, and the stock from Georgia arriving in July also showed 2 to 3 percent of this decay.

Anthracnose was particularly noticeable as a blemish in Georgia stock received in June and July. In one car the anthracnose spots were so numerous as to cover approximately half of the surface of some melons. Seventy percent of the melons in this car showed serious spotting.

Bruising is still one of the most serious troubles in shipping melons. It is not unusual to find from 5 to 50 percent of some loads badly damaged by bruising due to improper bedding and loading, or to shifting of the load during transit.

NOTES ON FIELD AND MARKET DISEASES OF CALIFORNIA TOMATOES
October 21 to November 3, 1938

ALTERNARIA ROT

Alternaria was found to be causing some leaf spot in many fields but was most severe in the Santa Maria district. This fungus was associated with some stem-end rot and decay following growth cracks and other injuries, but in most instances species of Macrosporium seemed to be more prominent. The decay frequently listed as alternaria rot during the latter half of the shipping season is usually due to Macrosporium.

ARSENICAL BURN

A rather peculiar type of fruit spot was observed in several fields. It was characterized by a definitely outlined dark brown to black slightly sunken area without external appearance of mechanical injury or fungous invasion. The affected tissue is firm and only skin deep. Most of the spots were on the shoulders of the fruit and vary from $1/8$ to $1/4$ inch in diameter. Tomatoes affected in this manner held for ripening usually have been found to show little or no decay. In each instance where this type of injury occurred it was found that the vines and fruits had been sprayed or dusted with some arsenical and this type of spotting did not occur prior to the application of the arsenical.

BLOSSOM-END ROT

Blossom-end rot was found in a few fields causing a slight amount of damage. Usually the affected fruits were readily discarded in the field and in the packing house so that ordinarily few diseased tomatoes of this type reach the market. There are two types of injury to the blossom end of the fruit: One shows as slightly sunken water-soaked, greenish-brown spots at or near the blossom end; the other as slightly discolored yellowish-brown to brown areas that are smooth or frequently slightly raised. The sunken water-soaked spots may continue to enlarge during transit and ripening and in many cases a secondary decay induced by species of Alternaria or Macrosporium causes extensive decay by the time the tomatoes are ripe. The superficial brown type of spot does not seem to enlarge during transit and it is seldom subject to invasion by decay-producing organisms. When the fruits are full red ripe it is often difficult to see this brown scar-like blemish.

BUCKEYE ROT

This decay was found only in the northern district near Brentwood and Stockton. A small percentage was observed in the field and in one or two packing sheds.

CLADOSPORIUM ROT (Cladosporium herbarum)

This fungus does not affect the tomato vines or fruits seriously until the latter part of the growing season. It seems to be ever present, but usually as a saprophyte on dead leaves and stems and discarded ripe fruits. It becomes especially prominent when the tomato vines are wet with fog or rains. At the time such weather conditions occur there are usually many dead and dying tomato plants which have been partially killed by virus troubles such as mosaic, spotted wilt, and western yellow blight (curly top). Fruits underneath the vines that are kept moist by fogs or rain are often infected by Cladosporium and develop tan to brown circular spots varying in size from $1/8$ to $1/2$ inch in diameter. Older spots become black in the center with greenish-tan borders. The internal decayed

tissue is spongy and grayish-tan in color. This decay is not often prominent in the field or packing house, but it is frequently of considerable importance on the receiving market, especially in stock that is so green that it must be held in the ripening rooms for 10 days or more. The severe spotting, discoloration, and decay of the tomatoes in the Santa Maria district this fall was largely due to infections by Cladosporium, Macrosporium and Alternaria. Serious decay and spotting did not occur until after rains. As long as the surface of the tomato is dry, even though the spores of these organisms may be present there is no infection, but when rains come or fogs develop at night, and the fruits are kept moist over a period of several hours or sometimes days, the spores on the surface germinate and infection occurs.

CLOUDY SPOT

The cause of the blemish known as cloudy spot is not known. It is thought by some to be due to insect injury, similar to stigmonose. Typical cloudy spot areas were observed in a few lots of tomatoes and in others a somewhat similar type of injury was noted, but with the difference that larger irregular areas were involved and within the walls small greenish-white cavities developed. In no instance was there any indication of fungus infection.

GRAY WALL AND GREEN STRIPE

In some localities a noticeable proportion of the tomato fruits showed grayish discolorations of the outer walls of the fruit. In this gray wall there was sometimes a light and gray-green mottling and in some instances green stripes extending down the sides of the fruits. Such tomatoes often had thin walls and were excessively watery. When they ripened they were practically useless because of poor texture and uneven ripening. Gray-walled fruits will usually ripen after a prolonged period, but irregular green, yellowish, and red blotches were frequently prominent giving the fruit mosaic appearance. In the green state these tomatoes could not properly be designated as showing mosaic, but after ripening many of them would ordinarily be classed as having that disease.

GHOST SPOT

Ghost spot was found affecting a small percentage of the fruit in several localities. This injury is usually so slight that it is not necessary to cull out the blemished tomatoes. The white circular marks in the skin of green fruits are noticeable but no decay follows and as red color develops the circles are barely visible.

LATE BLIGHT (Phytophthora infestans)

Late blight was of minor importance. Although a careful check of the fields was made, no indications of this disease were found until we reached Orange County. Near Santa Ana one field was found with a high percentage of late blight, but infection occurred so late in the season that few tomatoes were lost.

MACROSPORIUM ROT (Macrosporium sarcinaeforme) ?

Species of Macrosporium no doubt inhabit tomato vines to some extent throughout the season; but as in the case of Cladosporium, most injury is caused by these organisms during the latter half of the season. Infection usually takes place through the stem scar, but may also occur through wounds or growth cracks. The decay induced is brown to dark brown in color with a slightly water-soaked margin. The internal decaying tissue is brown and may extend into the seed cavity. On the surface of the larger spots a grayish-brown mold is visible. This is especially true in affected stock on the receiving market.

MOSAIC

Mosaic was found to be one of the most common diseases of tomatoes in all districts. In fact, it seemed doubtful that there were any fields free from mosaic. The symptoms on fruits vary, but usually are characterized by irregular blotches and calico patterns of yellowish-green and green tissue which have a tendency to fade out during ripening so that fruits showing a rather distinct mottling when green may show relatively little discoloration when ripe. Consequently, tomatoes which on inspection at shipping point show an appreciable percentage of mosaic are often found to show less mosaic on the receiving market.

Near Brentwood a conspicuous type of mosaic known as "shoe string" was observed. The plants so affected are stunted in growth, but rather bushy, and the leaf blade tissue is so dwarfed and stunted that little but the mid-rib remains. Plants showing this type of mosaic bear few fruits and ordinarily none are large enough to be marketable. The tomatoes that are formed may show distortion and many have a tendency to form peg-like outgrowths from the stem end region. No fruit mottling was observed.

MOTTLED RIPENING

Mottled ripening in a great number of instances occurs in fruits that showed gray walls when they were green. Much of this irregular ripening appears to be due to poor quality fruit set at the last of the season, to disturbance in nutrition, to virus diseases, to other diseases, as aging. Many tomatoes showing mottled and irregular ripening during the early turning stages do eventually take on a fairly uniform red color, but ordinarily they ripen so slowly that they are unsalable by the time they are fully colored.

PLEOSPORA ROT (Pleospora lycopersici)

The fungus Pleospora seems to be represented only by its Macrosporium stage in the fields. Careful observations failed to reveal any lesions on fruits or on the vines that showed perithecia. It is apparent, therefore, that inspectors at shipping point will not be able to identify this disease as such. In view of the fact that it is impossible to separate the Macrosporium stage of Pleospora from other species of Macrosporium and Alternaria without culturing or microscopic examination, it seems advisable for the inspectors to designate this stem-end decay as Macrosporium rot.

SCARRING

Several different kinds of scarring were observed on tomatoes in the field, most of them apparently due to wind whipping and other mechanical injuries during the development of the young fruit. One particularly bad type was found on tomatoes grown in dry farming areas on the upland soils that are granular and hard enough to cause a decided injury to young tomato fruits in contact with the soil or whipped against it during high winds. Numerous dark brown to black scars of various sizes and shapes were observed on tomatoes still on the vine.

SHOULDER BRUISES

Shoulder bruises on tomatoes are generally caused by pressure against the field boxes, in the grading bins, or on grading belts during the packing process. In some instances the bruised areas do not become greatly discolored and are of little consequence. In others even slight bruises change color and make the fruit very undesirable by the time it is ripened.

SHOULDER CHECKING AND DISCOLORATION

Shoulder checks and discoloration occur most severely toward the latter part of the growing season in stock that has been subjected to rain or heavy fogs. The cause of these slight checks and pits is not known, but it has been found that under transit and ripening conditions tomatoes so affected become seriously discolored and frequently show decay by the time they are ripe enough for marketing. When numerous small checks occur over the shoulders a brownish discolored area usually results by the time the fruits are red.

SPOTTED WILT

Spotted wilt has become increasingly important in tomatoes along the coastal regions during the past few years. The plants show spotting

and yellowish discolorations of the leaves, and the tips of many young shoots are killed. Spotted wilt on the green fruit is relatively inconspicuous, although light green circles and blotches may be observed on careful inspection. When the tomatoes ripen the affected areas are usually yellowish to orange and in some instances take on a slightly brownish cast, thus making the affected fruits much more conspicuous after ripening than before. In a great many instances mosaic and spotted wilt viruses are associated in the same plant and the fruit mottling then becomes very conspicuous. The brown circles, loops, and streaks increase in intensity as the tomatoes ripen. This increase in discoloration has been shown to develop during the transit period. Most of the distinctly mottled fruit on the receiving market appears to be due to the combination of spotted wilt and mosaic.

STREAK

The type of streak caused by a combination of latent potato virus and tobacco mosaic was not common this year unless it was confused with spotted wilt symptoms. That these diseases have been confused in the past is evidenced by our colored photograph (Pl. 7, D, U.S. Dept. of Agr. Misc. Pub. 121) of streak. Most pathologists now agree that this illustration is typical for spotted wilt, but when this photograph was taken in 1918 spotted wilt was not known in the United States.

PUFFS

Puffy tomatoes were observed in many packing sheds. Ordinarily it is not difficult to grade out the undesirably puffy fruit, but in some tomatoes a peculiar puffy condition underneath the stem end was very serious. Such fruits usually show excessive shriveling, shoulder checking, and conspicuous discolorations by the time they become ripe. From the standpoint of shipping point inspection these tomatoes are a serious problem because in cutting for puffiness the grades require that the fruits be cut in the middle. Fruits of the type just described do not show puffiness when cut in that region, but do show undesirable puffiness when cut 1/2 inch underneath the stem scar.