

CABBAGE DISEASES AND THEIR CONTROL

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Cabbage growing as a specialized industry has assumed considerable proportions in Wisconsin. This is especially true in certain areas centering about Racine and Kenosha in southeastern Wisconsin and in the Green Bay region, including Brown and Outagamie counties.

Cabbage is most profitable on rich low lands abundantly supplied with food and water. With the progressive reclamation of marsh lands in Wisconsin in years to come, this crop is bound to increase in importance. Wisconsin's crop is chiefly of the type known as Hollander or Danish Ball Head, valued for storage and winter use and which cannot be produced in like excellence southward. There is, however, an increasing acreage of kraut cabbage grown as a rule to supply local kraut factories. This too is destined to increase with further development of canning interests.

The cabbage is subject to a number of serious diseases and these have proved the limiting factor in continued success with this crop. Certain of these, notably black rot and black leg, are due to germs introduced with the seed. Fortunately, it is easy to avoid much of this danger by seed disinfection. For this purpose soak the seed for twenty minutes in a solution containing one part of standard formaldehyde (40 per cent solution, also known as formalin) in 250 parts of water (1 ounce formaldehyde to 2 gallons water). Then rinse well with clear water and promptly dry the seed. After such seed disinfection, it is of the utmost importance to choose clean soil for the

location of the seed bed. This means that the seed bed should be made in a new place every year.

The most serious disease, however, known as yellows, can not be controlled by seed treatment. This yellows disease is caused by a fungus parasite (*Fusarium*), which lives in the soil and attacks the roots of the plants. Once introduced it will persist for years in the soil, so that even long crop rotations does not fully overcome the difficulty. Soil so infested is "cabbage sick" and cabbage culture has proved no longer profitable upon it. This condition exists most strikingly in certain sections of southeastern Wisconsin where cabbage growing was formerly most successful.

Trials with various remedial measures have continued over some five years in the Racine district. No scheme of fertilization, soil sterilization or cropping has proved practicable. Fortunately, however, by continued selection a strain of Hollander cabbage has been perfected which is highly resistant to the disease. This has been grown successfully on even the "sickest" old cabbage fields with almost perfect immunity from yellows, whereas the commercial strains along side were practical failures. Thus in 1914, when the disease was very bad, the following results were secured on the trial grounds near Kenosha.

Field I.

Commercial: 56% lived; 31.5% headed;
1.75 tons per A.
Resistant: 100% lived, 100% headed;
18.3 tons per A.

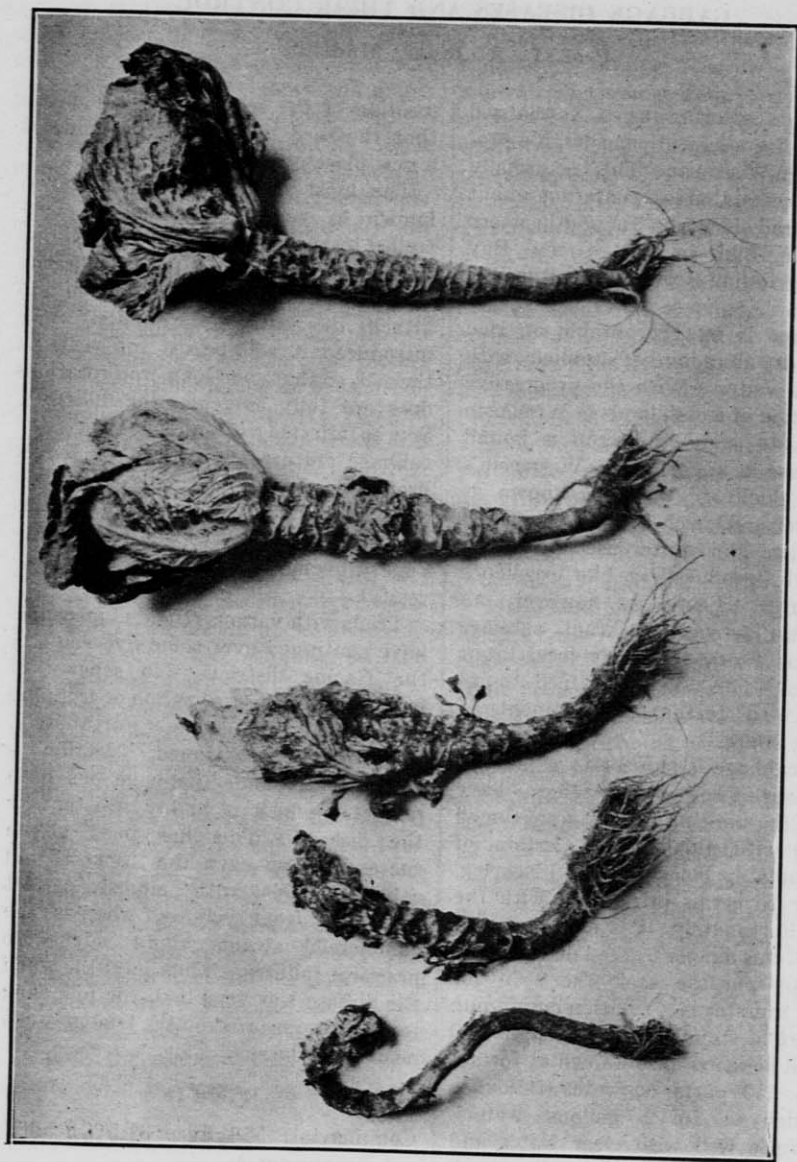


Fig. 1.—Cabbage Yellows Later Stages.
When the attack is not too severe, or the plant is somewhat resistant, the plants may continue a sickly existence through the season. Such plants are yellowish and the lower leaves keep dying and falling. The attack is often worse on one side, warping or curling the stems.



Fig. 2.—Resistant Plants on Uniformly Diseased Soil.

It is characteristic of a yellows sick cabbage field that its individual plants vary widely in susceptibility, some appearing quite immune and maturing perfect heads.

Field II.

Commercial: 36% lived; 17% headed;
2.25 tons per A.

Resistant: 100% lived; 95.5% headed;
19.2 tons per A.

Some two thousand head of this strain known as "Wisconsin Hollander" were grown on the trial grounds in 1914. The best of these, perhaps 1,500, are to be planted for seed growing in the spring of 1915. The seed thus secured will be distributed for planting in 1916 chiefly on the lands known to be "cabbage-sick" in Racine and Kenosha counties. Thereafter there should be no difficulty in securing and maintaining an adequate supply of home-grown "Wisconsin Hollander" cabbage seed to meet all needs. Meanwhile, the College of Agriculture will continue its efforts not only to improve upon this strain, but also to perfect similar resistant strains of the kraut types and earlier varieties.

DISCUSSIONS.

Supt. Norgord—How much of this particular seed is available at the present time?

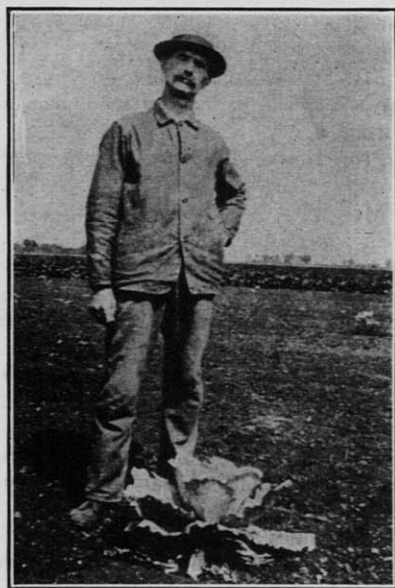


Fig. 3.—Selecting Disease Resistant Cabbages.

The selections were made in the field where the yellows was bad as could be found. The seed grown from these selected heads has, in every case, given plants relatively resistant to yellows even on the "sickest" soil.

Prof. Jones—At the present time we have barely enough seed to repeat the trials of last year. We shall come back into this neighborhood and plant trial plots the same as last year, but aside from this we have none that can be distributed for general growing this year.

A Member—When you have the seed, what plans are you going to follow in the distribution of it?

Prof. Jones—That is for the local cabbage growers' committee to get together with me next fall and decide. Fifteen hundred heads will grow quite a good deal of seed if handled carefully and the season favors, so every one in the neighborhood who has sick soil can get a start at least, thereafter each can grow his own seed.

Mr. David Imrie—How do you care for the heads saved for seed growing during the winter?

Prof. Jones—They are kept in a cold storage cellar or house.

Mr. Imrie—Do you take them up with the roots and then set the roots in soil in the storage cellar?

Prof. Jones—We pull them up by the roots and then they are laid in shallow layers two or three heads deep in a bin or on the cellar floors. We keep the seed heads in about the same way that the regular cabbage are stored.

A Member—Do you advocate raising cabbage year after year in the same soil?

Prof. Jones—No, sir.

The Member—Isn't that what made the soil sick?

Prof. Jones—That is what helped to give it a quicker start at first and has spread it faster, although the yellows parasite will gradually get into soils even if proper rotation is practiced. This fungus which causes yellows is so insidious that it may be introduced by drainage water, dust or seed, so

that in the first year of cabbage cropping one may perhaps lose ten or fifteen per cent of the plants. Once started in that way it will stay in the soil for years, even if you rotate with clover and other things.

A Member—In riding over this country that you have been speaking about, I have noticed cabbage and onions planted on the same fields year

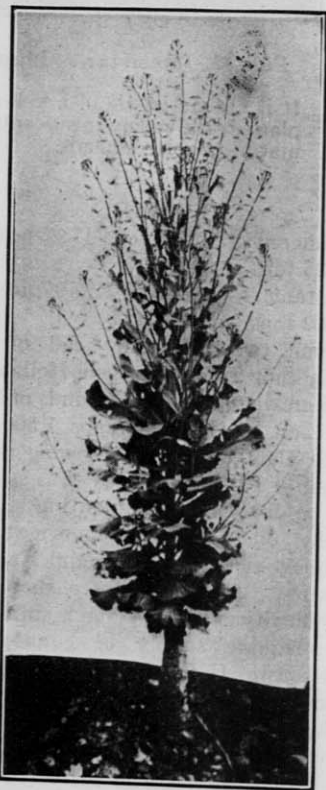


Fig. 4.—Cabbage Seed Plant.

For seed growing in this climate the plant is pulled up by the roots in late autumn, stored in a cool cellar or trench and set out again the following spring. Such a plant will in general produce from 1 to 6 ounces of seed. An ounce of seed carefully used will suffice for planting one-half acre.

after year and I have wondered why they didn't rotate as they did with other things.

Prof. Jones—With onions there are good reasons for continuing the crop year after year on the same land, although the danger of disease is so increased thereby that extra precautions must be used against this.

with proper rotation and culture the disease we hope will not be enough to spoil the crop commercially. It will not be "fool proof"—only good cabbage growers will succeed with this as with other crops. And remember also that we must not be over-confident. Our results are based on only three or four years' experience and there may



Fig. 5.—Field Trial of Selected Cabbages.

At the left is a row of one of the best strains of commercial cabbage showing the ravages of yellows. At the right a row of "Wisconsin Hollander" selected for disease resistance.

With cabbage, while it is often grown with success without much rotation, such practice is to be discouraged. We shall urge, of course, that this disease resistant strain be used only with reasonable rotation. In this way we believe that culture can be resumed on the old "cabbage sick" lands. This new strain is not absolutely disease proof and I do not believe it will ever be perfect, but

yet be a set back in this. I am sure, however, that we are on the right track. We are going to keep after it by further trial and selection year after year to improve upon what we have. With your patient and continual co-operation, we are surely going to succeed.

Mr. Scott—Would pasturing old cabbage fields with flocks of sheep tend to reduce disease?

Prof. Jones—Yes, certain diseases I believe such practice would help much. I wish that this could be done more generally. If any of you can try it out, I would like to hear more of the results.

A Member—How far from a field will this disease carry?

Prof. Jones—Probably as far as the soil may be carried either on tools and vehicles, by wind-blown dust or by drainage water. In one case we saw where it was carried about a mile by the washing of surface water.

APPLES IN WISCONSIN.

Frederic Cranefield, Secretary State Horticultural Society, Madison.

Wisconsin will soon attract attention as an apple State. The annual yield in a good year is about three million bushels, the number of barrels packed about 150,000, the balance sold locally or consumed on the farm.

We cut no figure in the apple market after November 1st; cold storage is not a problem. Ninety per cent of Wisconsin apples are summer and fall varieties, all greedily absorbed by Chicago and the Twin Cities, and the money in the bank before New York apples are picked.

That is just the way we want it, and the State Horticultural Society and other departments engaged in the fruit uplift, are advocating fall apples, including in this Fameuse and McIntosh.

Varieties for Wisconsin

We have a field all our own here and a market all our own. We are perfectly willing to let New York, Illinois and Missouri raise the winter apples. The kinds to plant in Wisconsin for either local market or shipment will vary but little for the entire State. Duchess, McMahan, Wealthy and Wolf River is the great quartette for Wisconsin.

McMahan is a Wisconsin seedling, a large apple with a beautiful creamy

yellow translucent skin usually blushed with bright red. A barrel of well-grown McMahan, well packed, will out-sell anything else on the Chicago market.

The other varieties are too well known to need description. During the past five years, over one-half of the planting has been of McIntosh, Fameuse and Dudley, the last named a Maine seedling that does exceedingly well in Wisconsin. It makes a splendid tree, the fruit is large, well colored, of good quality and three or four weeks later than its parent, Duchess.

All of these varieties, except Fameuse, come into bearing very early and therein lies one of the great advantages of Wisconsin as an apple State, from a dollar and cents standpoint, over states east or south of us.

Baldwins, Spits and Greenings take twelve to fifteen years to get under way and are not yielding profitable crops much under twenty years. Wisconsin fall apples begin to bear as soon as set out and orchards well cared for will yield two bushels per tree six years after planting, while at ten years the orchard should yield eight to ten bushels per tree. At twenty years the early kinds, such as Duchess and McMahan, will reach the maximum of