Field diseases of onions in coastal British Columbia'

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Surveys were carried out in **1975** and **1976** lo determine the distribution of white rot ***[Sclerotium cepivorum]*** and other disorders of onion ***(Allium cepa***) in coastal British Columbia. White rot was found in green bunching onions on **7** of **47** farms and in dry bulb onions on **5** of 13 farms. Average losses due to all disorders were estimated at **14%** of the green onion crop and **24%** of the dry bulb crop.

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On a effectue des releves en **1975** et **1976** pour determiner la distribution de la pourriture blanche ***(Sclerotium cepivorum)*** et d'autres accidents de l'oignon ***(Allium cepa)*** dans la region côtière de la Colombie-Britannique. On a constaté la présence de pourriture sur des oignons verts a botteler dans **7** fermes sur **47,** et sur des oignons secs de bulbilles dans **5** fermes sur **13.** Les pertes moyennes attribuables à tous les accidents sont estimees a **14%** pour les oignons verts eta **24%** pour les oignons de bulbilles.

Green bunching onions have been grown for decades on the small-acreage market gardens in the muck soils of South Vancouver, South Burnaby and adjacent areas. In 1975 approximately 1.46 million pounds (662 tonnes) valued at $309,000 were produced on about 35 acres (74 ha).

Spring-seeded dry bulb onions are a more recent addition to the list of vegetable crops grown commercially in the coastal area. Production has grown steadily over the last 10 years but has now levelled off at approximately 300 acres (741 ha), all grown in muck soils at Cloverdale, 30 miles east of Vancouver. In 1975, 11.8 million pounds (5,352 tonnes) valued at $1,029,-000 were produced.

In 1970 two small patches of plants affected by onion white rot ***[Sclerotium cepivorum*** Berk.] were found in one field of dry bulb onions in the cloverdale area (1). By 1974 the disease was found in every onion field on that farm and caused a loss of about 50% of the crop.

In the spring of 1975, regulations were passed under the British Columbia Plant Protection Act forbidding the growing of onions on land known to contain ***S. cepivorum*** and restricting the movement of soil and machinery from such land. To determine the usefulness of this regulation as a control measure, surveys of all onion farms in coastal British Columbia were conducted in 1975 and 1976.

In addition to white rot, the survey covered all onion field diseases because certain other pathogens such as smut ***[Urocystis magica*** Pass. ap. Thum.] were becoming a concern to growers.

The last published estimates of crop losses due to onion diseases in coastal British Columbia are those of Toms in 1965 and 1966 (2, 3). His estimates were based on random observations rather than detailed surveys and the only diseases mentioned were smut and downy mildew in the green bunching onion crop and neck rot in the dry bulb crop.

The estimated losses in green bunching onions were 5% each from smut and downy mildew in 1965 and 1% and 2%, respectively, in 1966; losses to the dry bulb crop from neck rot were 15% each year (2, 3).

Methods

Green bunching onions

All of the known green onion producing farms were surveyed twice in 1975 and twice in 1976. As green onions are transplanted or seeded successively from early spring to late summer it is possible that not all crops were seen during the two surveys. In 1975, 27 acres were surveyed and in 1976, 33 acres. This probably represents more than 75% of the acreage in both years.

Surveyors wore disposable polyethylene boots to prevent the movement of soil from farm to farm. At each farm they walked between beds, visually observing all plants, stopping frequently to pull bunches of approximately 10 plants to determine the incidence of root disorders. Maps were drawn of each farm showing the location of onion fields and disorders within the fields at each survey date.

Dry bulb onions

All of the commercial dry bulb onion farms were surveyed twice each year. In contrast to the green onion survey, this meant that each crop was examined twice. In 1975, most fields were surveyed by walking through in a W pattern pulling 200 plants at each of five locations in a typical 10 acre field. In smaller fields or where white rot was suspected in 1975 and in all fields in 1976, the surveyors walked down every 5th bed to avoid missing any small areas of abnormal growth. Again detailed examination was made of 200 plants pulled at five locations. When white rot was found, the

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Table 1. Incidence* of diseases, physiological disorders, and maggot injury in green bunching onions in 1975 and 1976

Disease or disorder	June 1975 No. of farms	June 1975 Acreage %	July 1975 No. of farms	July 1975 Acreage %	July 1976 No. of farms	July 1976 Acreage %	August 1976 No. of farms	August 1976 Acreage %
Downy mildew	0		0		0		11	0.8
Fusarium rot	0		0		1	0.1	2	0.1
Pink root	1	0.1	1	1.0	0		1	0.1
Smut	3	0.5	4	0 6	4	0.8	3	0.5
White rot	3	0.3	0		5	0.2	0	
Tip dieback and botrytis blast	29	0.7	31	21.7	10	2.6	30	9.6
Other disorders	17	11.0	11	1.8	7	0.4	8	3.1
Maggot injury	18	3.9	7	0.7	20	0.7	21	0.4

* No. of farms affected out of 45 surveyed in 1975, 47 in 1976; and % of total acreage affected.

Table 2. Incidence of diseases, physiological disorders, and maggot injury in dry bulb onions on 13 farms in 1975 and 1976

Disease or disorder	June 1975 No. of farms	June 1975 Acreage %	July 1975 No. of farms	July 1975 Acreage %	July 1976 No. of farms	July 1976 Acreage %	August 1976 No. of farms	August 1976 Acreage %
Downy mildew	0		6(9)*	2.6(18.0)*	2	0.1	13	70.2
Fusarium rot	0		5	1.2	2	0.4	4	0.1
Pink root	1	0.1	4	12.0	0		5	16.0
Purple blotch			0		1	0.1	2	0.1
Smut	10	4.0†	7	1.8**	10	1.2	9	0.4
White rot	0		0		2	0.1	4	0.2
Tip dieback and botrytis blast	4	7.0	9	18.0	8	11.0	8	18.0
Maggot injury	4	0.5	0		11	0.1	9	0.1

* A third survey for downy mildew was conducted in August, 1975; the results of that survey are shown in parentheses.
† Does not include 14 acres turned under prior to the survey due to more than 50% smut infection.
** Does not include 5 acres turned under prior to the survey due to more than 50% smut infection.

area was carefully determined. In the case of isolated infections diseased plants were pulled, placed in plastic garbage bags, removed from the field, and destroyed.

Results and discussion

The survey results are summarized in Tables 1 and 2. The green bunching onion crop was remarkably free of serious diseases (Table 1). By far the most serious problems were the tip dieback - botrytis blast complex and physiological disorders such as unsuitable soil conditions and herbicide injury. Although smut and white rot were present on several farms, infection in the presence of inoculum seems to be the exception rather than the rule. Downy mildew is more serious than indicated by the survey, frequently destroying whole crops in September and October.

In the dry bulb crop also, tip dieback and botrytis blast is of major concern (Table 2). The cause of tip dieback is not known. A soil sampling study carried out in conjunction with the disease survey in 1976 indicated no correlation with soil pH, salinity, or nitrate levels. (R. Kingston, personal communication).

The possible role of ozone injury in the Cloverdale area has not been investigated. Smut losses were high in 1975 but improved disease control methods reduced infection in 1976. Due to the unusually wet August of 1976, downy mildew became epiphytotic and yield reductions as high as 40% were probable in some fields.

Although white rot was not found in the Cloverdale bulb onion area in 1975, it did show up on four farms in 1976. Three of these appeared to be related to the original discovery in 1970 while the other appeared to be a completely separate outbreak.

There are no published reports of pink root [*Pyrenochaeta terrestris* (Hansen) Gorenz, Walker & Larson] or purple blotch [*Alternaria porri* (Ell.) Ciferri] from coastal

British Columbia, but they have been observed here previously. Pink root is particularly common late in the season.

Each disease has a different effect on yield. For example, low levels of smut (<5%) may result in fewer but larger bulbs with little net effect on dollar value. Higher levels of smut reduce yield and dollar value. Downy mildew can completely destroy green onion crops. In dry bulb onions it can reduce yield by up to 40% and delay maturity which may lead to storage problems. Pink root may occasionally reduce yields by up to 30% but helps to mature the crop and prevent botrytis neck rot in storage.

Taking all of these factors into consideration, a dollar loss due to all disorders in the green bunching onion crop would be 14% or $42,000. This figure does not include the cost of control measures.

In the case of bulb onions, botrytis neck rot and other storage rots are acknowledged to be the greatest cause of loss. In 1965 and 1966, Toms estimated the losses due to neck rot at 15% of the crop (2, 3). While the neck rot losses in the 1976 crop were at least 15%, observations over the past several years suggest 12% as a realistic long term average loss. Adding to this figure the losses due to other disorders indicated in the 1975 and 1976 field surveys results in a total loss due to diseases and other disorders of 24% or $240,000. Again, the cost of control measures is not included. By these estimates and based on 1975 prices, it would appear that the total annual loss due to diseases and other disorders of onions in the lower Fraser Valley is in excess of $0.25 million.

Literature cited

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