

# Defects of Potatoes Caused by Handling

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**M**OST producers exercise great care in the selection of seed, and they follow approved practices in planting and cultivating the crop as well as in combating pests and diseases all through the growing season. It is equally important that the farmer take precautions at harvest time to prevent the needless injury to good potatoes.

A study<sup>1</sup> has been made of all Federal potato inspection certificates for the 1937 Minnesota potato crop. There were included in this study 4,344,698 sacks of potatoes or about 30 per cent of the total estimated production in the state. The results obtained should therefore be representative of the potatoes grown that year. Former studies of a similar nature for Minnesota potato crops for years 1931 to 1936 support the evidence here presented that handling of potatoes accounts as much for lowered grades as all other factors combined.

It is interesting to note that of all the defects which lower the grade of potatoes when they are presented for inspection, the most prevalent are those which might have been controlled by the grower. The grower has little or

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no control over defects occurring because of growth conditions such as hollow heart, growth cracks, and second growth. He has some control over defects resulting from pests and disease such as scab, dry rot, and worm injury. However, the grower can eliminate almost entirely defects such as bruises, cuts, and dirt, which result from handling.

Summarization of the inspection certificates of the 1937 potato crop indicates that bruises and cuts were defects most commonly mentioned. These two defects accounted for 45 per cent of all defects listed and one or both were mentioned in practically every lot of potatoes which failed to grade U. S. No. 1. In addition to bruises and cuts, other defects such as dry rot may have resulted from handling. It is known that disease organisms enter the potato when bruised and cut and in an advanced stage would probably be listed by the inspector as rot instead of bruises or cuts. It is therefore safe to assume that at least one half of all defects are directly traceable to handling.

It is the practice of potato inspectors to mention defects present only when the lot of potatoes fails to meet grade requirements. Similar defects, but of less serious magnitude, are probably present in lots meeting grade requirements. The accompanying table lists the percentages of all the lots of potatoes that failed to grade U. S. No. 1 in which bruises and cuts were mentioned. The counties are those in which at least 20 car lots of potatoes failed to grade U. S. No. 1.

Defects resulting from handling other than bruises and cuts are relatively unimportant. Although few potatoes failed to grade because of dirt, a discussion of this factor is included because of the importance of appearance in salability and because this is affected by handling.

### **Bruises**

Bruises are the most serious defect caused by handling. As indicated in table 1, bruises were mentioned in all carlots of potatoes that failed to grade U. S. No. 1 in some counties, and in more than 90 per cent of all but four

Table 1. Defects and Condition of Potatoes by Counties, 1937

County	Defects in lots failing to grade U. S. No. 1		Condition of all lots (including U. S. No. 1)		
			Proportion which were		
	Proportion having Bruises	Cuts	Clean to fairly clean	Fairly clean to slightly dirty	Slightly dirty to dirty
Becker	96.2	53.2	32.3	41.8	25.9
Beltrami	100.0	76.2	48.4	22.7	28.9
Benton	100.0	89.5	35.1	.....	64.9
Cass	100.0	85.7	19.8	31.2	49.0
Clay	93.9	47.5	27.2	41.1	31.7
Chisago	97.3	48.6	69.4	20.6	10.0
Clearwater	97.1	86.8	29.8	52.9	17.3
Douglas	100.0	69.0	20.9	29.0	50.1
Freeborn	58.5	52.7	34.0	39.3	26.7
Hennepin	98.3	84.6	41.7	18.1	40.2
Hubbard	95.8	70.8	42.8	6.6	50.6
Isanti	96.5	86.1	77.7	14.9	7.4
Itasca	80.0	75.0	6.2	31.0	62.8
Kittson	99.2	87.0	51.1	45.3	3.6
Mahnomen	98.4	63.6	47.4	37.3	15.3
Marshall	93.9	89.0	52.1	45.6	1.8
Mille Lacs	99.2	97.4	29.1	13.7	57.2
Morrison	91.9	66.1	67.3	23.6	9.1
Norman	86.6	47.1	34.6	38.9	26.5
Ottertail	91.8	58.9	70.6	21.4	8.0
Pine	95.5	34.1	69.0	3.2	27.8
Polk	94.6	74.3	24.5	53.5	22.0
Red Lake	96.9	93.8	7.1	78.6	14.3
St. Louis	98.3	84.2	57.4	26.8	15.8
Todd	90.9	86.4	15.8	52.6	31.6
Wadena	95.0	75.0	56.0	5.2	38.8
Wilkin	86.6	38.0	35.6	36.4	28.0
State	92.8	59.3	34.4	40.2	25.4

counties. Bruises are serious not only because they result in discoloration and drying out, but also because they permit the entrance of bacteria which may cause various types of rot. Consumers object to the resulting waste and inconvenience, and the poor appearance of bruised potatoes discourages demand.

Bruises are caused by faulty diggers and careless handling. Potato tubers are tender and must be treated accordingly. Bruising starts in the digger as the potatoes are shaken out of the soil. Sharp, exposed corners, edges, and ends of digger chains bruise the potatoes forcibly brought in contact with them. Potatoes dropping from one digger chain to another are bruised. Exposed, sharp metal parts can be covered by strips of heavy, discarded machine belting or canvas. Links in the digger chain can be covered by rubber tubing made for that purpose. The digger chain or apron should be carefully inspected to see that the ends of the links are turned down and not up. The second and lower apron can be eliminated by making the two aprons continuous, eliminating the drop from one apron to the other.

Some of the elliptical sprockets that toss the chain to shake out the soil may be replaced by round ones, depending upon the condition and texture of the soil, in order that the potatoes may be separated from the soil with as little agitation as possible. In short, the digger should be examined critically to discover every possible cause of bruising and then these should be eliminated as completely as possible. Remember that potatoes are tender and must be treated accordingly if their salability is to be maintained.

No small amount of bruising results from careless or improper picking and packing. Potatoes should be allowed to lie in the open air to dry thoroughly and give the skin a chance to harden. Sharp edges of crates or baskets should be padded with burlap. Rubber-coated wire baskets that furnish such protection are on the market. Potatoes should not be tossed into receptacles if bruises are to be avoided.

Bruises can be further prevented if crates or baskets instead of bags are used in handling potatoes from the field. Care must be exercised in emptying the receptacle into the bin. If it is necessary to walk over the potatoes in the bin, use a plank or board to avoid bruises.

## Cuts

Cuts result from careless digging of potatoes. While not so serious as bruises, cuts were mentioned for more than 50 per cent of the carlots except in five counties. The main objection to cuts lies in the fact that they detract from the appearance of the potatoes, even clean, complete cuts. Such cuts cork or heal over readily and result in little waste. A cut into a potato, however, has the same objections as a deep bruise.

Cuts are caused mainly by the blade of the digger and result when the digger is set to dig too shallow so that the blade does not get below all of the tubers. Depth of digging can be adjusted so as to reduce digger cuts to a minimum.

Rough cuts result from potatoes striking sharp edges of the digger. Such cuts are more serious than smooth digger cuts, as they have the undesirable characteristics of a bruise, as well as of a cut. Special attention should be given those sharp edges.

## Dirty Potatoes

Dirt on potatoes may not seriously affect grades, and some dirt on potatoes is unavoidable, nevertheless dirt is important enough to be mentioned by the inspectors. The degrees of dirtiness are grouped as follows: clean to fairly clean, fairly clean to slightly dirty, and slightly dirty to dirty. For the state as a whole, 34.4 per cent of lots were considered clean to fairly clean; 40.2 per cent fell in the group of fairly clean to slightly dirty; and 25.4 per cent were in the group considered slightly dirty to dirty. The main objection to dirty potatoes comes from the housewife who wants attractive, clean potatoes. It must be remembered that Minnesota potatoes must compete in appearance with washed potatoes that are shipped in from other states.

The amount of dirt on potatoes depends upon the type of soil, the amount of moisture in the soil at the time of

digging, and the methods of handling. Potatoes coming from a heavy clay or muck soil will show more dirt than those grown on sandy or loamy soil. Potatoes should be allowed to dry off thoroughly after digging and before they are picked. The dry soil will then fall or brush off, whereas if the potatoes are handled while still damp, the soil on them will smear into the skin.

### Grading Injuries

Bruises and cuts may result from faulty grading operations. Sharp edges and corners should be eliminated or covered wherever potatoes come in contact with them in the grading operation. Rubber spools are used in some graders in the place of wire or slat aprons, materially reducing injuries.

Some graders are equipped with brushers to remove as much dirt as possible and improve materially the appearance of the potatoes. Best results are obtained if the potatoes are allowed to dry thoroughly before they are handled.

Care in every handling process must be exercised to reduce cuts and bruises. Ask your county agents for suggestions for avoiding these injuries.

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