The Use of the Bruise Detection Kit

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The amount of bruising occuring in the Columbia Basin during the past season has been estimated to be about twenty-five percent severe bruise. Continuing tests at the fresh packing operations of Sunspiced, Inc. at Moses Lake, Washington reveal that this figure is accurate. This amount of old bruise which has occurred during the harvest operation represents an average loss to growers of $5.00 per ton. Some of the better lots of potatoes with a minimal amount of damage many have a loss of $2.00 per ton, while the poorer rougher lots will have losses that are as high as $14.00 per ton. These losses occur in those potatoes that are bruised over 5% pare-away required for US #1's and in most instances they have more than 10% bruising that is allowed for US #2's. Without facts and figures for preceding years it is difficult to say that 1967 was any worse than any other year. If this amount of bruising shows very many years 50% of the growers are in danger of bruising themselves right out of the Potato Business.

The grower, however, is not the only loser in a situation of this type. Everyone who ships potatoes can count on increased costs in sorting when he attempts to sort badly bruised lots. Processors are subjected to higher cost when seriously bruised potatoes are delivered into his plant for processing. In some lots the bruising necessitates a 50% pare-away and cull out.

Campaigns have been carried on throughout the years to combat bruising, but evidently they have met with only limited success. Contract harvesters and growers still persist in digging too fast with poorly adjusted equipment. The very nature of the slight bruise makes it difficult to detect. Often times, by the time the bruise is detected the harvest is completed, and it is too late to make a correction in methods or equipment. The real need in an anti-bruise campaign is for a test than can be carried out in the field at harvest time when bruising is actually occuring. The test is more meaningful if you can demonstrate fresh bruise in the presence of the people who operate the different pieces of equipment used in harvesting and handling potatoes.

Such a kit as outlined was made available to the potato industry this past season by the Maine Cooperative Extension Service. The kit is simple and easy to operate, but nonetheless it is accurate. An explanation of how it works is given by Mr. Paul N. Mosher, Potato Specialist from the State of Maine.

"When a potato tuber is injured a natural color change

occurs from pink to gray-black. This change is brought about by the enzyme tyrosinase being exposed and catalysing the oxidation of the naturally occuring tyrosine. This reaction is slow and often difficult to see.

Tyrosinase will also catalyse the oxidation of para-cresol to form quinones which have an orange-red color. Adding sodium hydroxide to the solution changes the pH from very acid to near alkaline and speeds up the reaction and color change."

EQUIPMENT REQUIRED

Rubber Apron	1.50
Rubber Gloves	.70
Plastic Wastebasket	3.00
Plastic Bucket (4 qt.)	2.00
Plastic Funnel	1.00
2 gallons solution	.56
2 Plastic gallon jugs (Used bleach jugs)	--
	8.76+

+approximate prices

SOLUTION FORMULA

For each one gallon of solution mix 30 grams of para-cresol with 15 grams of sodium hydroxide and add one gallon of water.

TESTING PROCEDURE

1. Select a ten pound sample of potatoes and wash them cleam of dirt.

2. Place samples in a four quart plastic bucket and immerse them in the testing solution which has been placed in the plastic wastebasket. Allow the potatoes to stand in the solution for one or two minutes.

3. Remove the bucket from the wastebasket and allow the solution to drain back into the wastebasket.

4. Place the treated potatoes on a burlap sack or other disposable surface and allow them to stand for ten minutes.

5. Fresh bruising will show up as reddish-orange marks in approximately two minutes. The color will intensify somewhat in ten to fifteen minutes.

6. At the completion of the testing pour the testing solution back into the gallon plastic containers. A plastic funnel will facilitate this transfer with a minimum of spilling. The bucket, wastepaper basket and funnel should be rinsed with clean water after each use. It is also wise to rinse the rubber gloves and apron.

7. Due to its distinctive odor, the testing solution should be used in a well-ventilated area.

SAFETY PRECAUTIONS

1. This solution is very caustic and very poisonous in nature, and should be stored in plastic non-breakable containers which are appropiately marked with poison labels.

2. The use of rubber gloves and rubber aprons is mandatory to protect the person conducting the test.

3. Extreme care should be exercised that the solution does not come in contact with clothing, the eyes, mouth or any exposed parts of the body.

4. Containers should be thoroughly washed out after every use. The rinse water must be disposed of in such a way that it will not contaminate a water supply or a stock feeding operation.

5. Treated potatoes must be disposed in some manner that will insure that they will be eaten by neither humans or animals.

CONCLUSION

Because of its low cost and simplicity of operation it is almost mandatory for anyone concerned with potato handling to obtain a bruise test kit. If possession of a kit is your first obligation, then the second and most important obligation you owe to yourself is to USE IT. Utilize this kit to check every conceviable step in potato handling, and find out where the fresh bruises are occuring. When you have located the source of your trouble take suitable corrective measures. Probably the most important corrective measure you can undertake is to tighten up that loose nut behind the wheel of the tractor.

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1968 POTATO INSECT CALENDAR

by

B. J. Landis, D. M. Powell and J. A. Onsager[1/]

Season or Month	Pest	Pesticide and Amount of Active Ingredient Recommended Per Acre	Time or Frequency of Application
Spring: April 1-15 or later; not before soil temperature at the 6-in depth is 50°F. or higher	WIREWORMS The larvae bore holes in seed-pieces and developing tubers.	Diazinon*, 3-4 lb. Parathion*, 4-6 lb.	Broadcast diazinon or parathion granules before planting and thoroughly mix with the top 6-9 inches of soil. If wireworms average less than 1/sq. ft., apply 21-28 lb. of 14% diazinon granules or 40 lb. of 10% parathion granules per acre. If wireworms average 1 or more/sq. ft., either (1) wait until April 21 or later before applying the above treatments, or (2) apply 50-60 lb. or 10% parathion granules per acre. If treatment must be done before April 1-15 (before soil at 6-in. depth has warmed to 50°F.) and wireworms average less than 1/sq. ft., apply 50-60 lb. of 10% parathion granules per acre.
Spring to late summer when temperature of soil at 6-in. depth is between 45 and 90°F. Allow 2-3 weeks before planting.		Ethylene dibromide 3 gal. of 83% solution Dichloropropane-dichloropropene mixture (DD or Vidden-D) 25 gal. Telone, 20 gal.	Apply any of these fumigants undiluted, or mix fuel oil with ethylene dibromide and increase volume to meet equipment requirements. Apply 8-9 in. in the soil with chisel, sweep or blade equipment. Space chisels 12 in. apart. Compact soil slightly after application.
Summer - not later than August. For control the following year.		DDT**, 10 lb.	Broadcast granular, dust or spray formulations and mix thoroughly with top 6-9 in. of soil. Treat only new land, or land not treated with DDT for 4-5 years.

1/ Entomology Research Division, Agr. Res. Serv.

* Diazinion and parathion are short-lived insecticides. Their success for wireworm control depends on the initial wireworm population and the percentage killed. The number of wireworms per square foot of soil surface can be estimated in March by sampling to a depth of 15 inches. For maximum kill, treatments must remain highly toxic until at least May 15. The percent kill can be increased by applying more insecticide or by delaying treatment, as suggested in the Time or Frequency of Application column. Waiting 2-3 weeks before treating in the spring is equivalent to adding about 1 extra pound of insecticide per acre.

** Do not feed potatoes from DDT-treated fields to dairy cattle.

Potato Insect Calendar - 1968

Season or Month	Pest	Possible Damage if Soil or Crop is not Treated	Pesticide and Amount of Active Ingredient Recommended Per Acre	Time or Frequency of Application
May and often through August until extremely hot weather stops reproduction.	APHIDS	Very small numbers of aphids, either winged or wingless, can spread leaf roll between or within fields. (Leaf roll is a cause of net necrosis) Insecticides alone may not be sufficient to prevent leaf roll spread. Plant clean seed, rotate fields, destroy volunteer potato plants in old fields and in cull piles from April 15 to June 15.	Disulfoton (Di-Syston) 3 lb.*	On early plantings (Feb.-April): sidedress 30 lb. 10% granules per acre when 75% of plants have emerged and irrigate immediately. DO NOT SIDEDRESS AFTER MAY 20. Start endosulfan foliage treatments June 15 and apply at least 4 applications. On later plantings (May-June): Apply 30 lb. 10% granules per acre in bands at planting time. Irrigate when plants emerge. Start endosulfan foliage treatments June 15, or later, when 75% of the plants have emerged. Disulfoton alone has not provided season-long protection against aphid attack.
			Endosulfan, 1 lb.* (Thiodan)	Start spraying foliage June 1; continue bi-weekly for at least 5 applications.
May through August.	CUTWORMS	Cut off plants or defoliate them. Occasionally feed on the tubers.	DDT**, 2 lb.	Apply dusts or sprays when cutworms first appear.
May through August.	TUBER FLEA BEETLE AND/OR WESTERN POTATO FLEA BEETLE	Adults chew holes in leaves; larvae make tunnels in the tubers	DDT**, 1-1/2 lb. Endosulfan, 1 lb. (Thiodan)	Apply dusts or sprays to foliage when adults average 2 per 10 sweeps. The tuber flea beetle has not been found in The Basin; the western potato flea beetle seldom requires control.

* Do not mix disulfoton granules with dry fertilizer: the granules tend to separate out and this results in erratic rates of application and insect control. Either apply disulfoton granules separately with calibrated applicators or apply a dry fertilizer on which a liquid disulfoton concentrate has been sprayed at the required rate.

** Do not feed potatoes from DDT or Endosulfan treated fields to dairy cattle.

Potato Insect Calendar - 1968

Season or Month	Pest	Possible Damage if Soil or Crop is not Treated	Pesticide and Amount of Active Ingredient Recommended per Acre	Time or Frequency of Application
May through September	COLORADO POTATO BEETLE	Adults and larvae strip plants and lower yields.	Endosulfan, 1 lb.* (Thiodan) DDT*, 1 lb.	Apply DDT in May if adults are unusually abundant. The disulfoton plus endosulfan program for aphid control will also control potato beetle larvae through June to August. If neither is being used on a schedule against aphids, apply endosulfan when larvae outnumber eggs.
Spring or Autumn - when temperature of the soil at 6-in. depth is between 45 and 90°F. Allow 2-3 weeks before planting.	GARDEN SYMPHYLAN	Symphylan damage to tubers resembles tunnels made by flea beetle larvae	Telone, 25 gal. Dichloropropane-dichloropropene mixture (DD or Vidden-D) 30-gal.	Effective only in sandy or loam soils worked into seedbed condition. Fumigants are effective when soil is neither very wet nor very dry. Inject the fumigant 8-9 in. deep and slightly compact the soil.
June through August	LYGUS BUGS	Adults cause the terminal leaflets to wilt and die.	Endosulfan, 1 lb.* (Thiodan) DDT*, 2 lb.	Should be no problem where the recommended aphid control program is followed. Apply sprays as needed after Lygus have migrated from cut hay or weeds killed from drought.
June through September	LEAFHOPPERS	Leafhoppers can spread aster yellows and curly top.	Endosulfan, 1 lb.* (Thiodan) Disulfoton, 3 lb.	The endosulfan or disulfoton plus endosulfan treatment programs recommended for aphid control will control leafhoppers.
Mid-June through August	TWO-SPOTTED SPIDER MITE	Mites kill leaves and hasten maturity	Carbophenothion, 1 lb. (Trithion) Dicofol (Kelthane) 1 lb. Parathion 2% + sulfur 50% dust mixture 30-35 lb.**	Treat foliage when first mites are found, or at first signs of feeding injury. Carbophenothion is most effective in the Moses Lake-Othello area and dicofol at Quincy. Apply parathion no later than 5 days before harvest.

* Do not feed potatoes from DDT or endosulfan treated fields to dairy cattle.

** Use prepared or custom mixtures of parathion and sulfur.

Potato Insect Calendar - 1968

Season or Month	Pest	Possible Damage if Soil or Crop is not Treated	Pesticide and Amount of Active ingredient Recommended Per Acre	Time or Frequency of Application
July Through September	IRIS WHITEFLY	Scale-like larvae weaken plants. The eggs resemble those of the potato psyllid present in some other states.	Endosulfan, 1 lb.* (Thiodan) DDT*, 1 lb.	The endosulfan treatment program recommended for aphid control will control the iris white-fly. More than 1 application of either insecticide may be required to control adults.
July through August	THRIPS	Adults and larvae scar lower side of leaves.	Endosulfan, 1 lb.* DDT*, 1-1/2 lb.	The endosulfan treatment program recommended for aphid control will control thrips, or apply DDT spray when thrips are abundant.
July through August	BLISTER BEETLES	Adults consume the leaves	DDT*, 1-1/2 lb. Naled(Dibrom) 1 lb.	Treat infested areas quickly.
July through August	GRASSHOPPERS	Insects devour leaves and stems	Malathion, 1/2 to 3/4 lb. Toxaphene, 1-1/2 lb.	Treat adjacent, infested, uncultivated land or 12-ft. wide non-crop border of field.
Summer - not later than August for control the following year.	WHITE GRUBS	Larvae damage seed and developing tubers	DDT*, 10 lb.	Broadcast granular, dust or spray formulations and mix thoroughly with top 6-9 in. of soil. Repeat 5-7 years later, if required.

* Do not feed potatoes from DDT or Endosulfan treated fields to dairy cattle.

PRECAUTIONS IN HANDLING INSECTICIDES

Insecticides used improperly can cause injury to man and animals; handle them with care. Follow directions and heed all precautions on container labels.

Insecticides should be kept in closed, well-labeled bags or other containers where they will not contaminate food or feed and where they cannot be reached by children, livestock, or pets. Wear clean, dry clothing and wash hands and face before eating or smoking. Avoid repeated or prolonged inhalation of insecticides in any form.

If you spill insecticide concentrates on the skin or clothing, wash it off the skin and change clothing immediately. Launder clothing thoroughly before wearing it again. If some gets in your eyes, flush them with water for 15 minutes and get medical attention.

DDT, dicofol, malathion, sulfur, and toxaphene can be used safely without special protective clothing if they are in dilute dust, water-spray or granular forms. Diazinon, endosulfan (Thiodan), naled (Dibrom) and toxaphene can be absorbed directly through the skin in harmful quantities. When working with these insecticides, take the same precautions as with concentrates.

Carbophenothion (Trithion), dichloropropane-dichloropropene mixture, disulfoton, ethylene dibromide, parathion, and Telone are highly toxic and may be fatal is swallowed, inhaled, or absorbed through the skin. They should be applied only by persons who are thoroughly familiar with the [illegible]

with all of the precautions on the labels. Reduce the danger of skin exposure by wearing protective clothing and respiratory devices.

Do not transfer ethylene dibromide, dichloropropane-dichloropropene mixture, or Telone from one container to another in a closed room; do not breathe the fumes.

Avoid drift of insecticides to nearby wildlife habitats, bee yards, crops, or livestock. Many insecticides are highly toxic to fish and aquatic animals. Keep insecticides out of all water sources such as ponds, streams, and wells. Do not clean applicating equipment or dump excess insecticides near such water or where this may contaminate pastures or other feed. Carefully dispose of empty bags and other containers and bury these and surplus insecticides in a sanitary landfill dump, if possible. If this is not available, burn empty bags and cardboard containers and bury the ashes where they will not contaminate water supplies. Break or crush glass and metal containers and bury with excess insecticides at least 18 inches deep in a level isolated place where they will not contaminate water supplies.