DEPARTMENT OF AGRICULTURE, SOUTH AUSTRALIA

Agronomy Branch Report

THE TOXICITY OF MALDISON ON WHEAT TO VARIOUS CURCULIONIDS

P.R. Birks

Report No. 6

January 1969

THE TOXICITY OF MALDISON ON WHEAT TO VARIOUS CURCULIONIDS

P. R. BIRKS

Senior Research Officer, Entomology

Agronomy Branch Report

January 1969

THE TOXICITY OF MALDISON ON WHEAT TO VARIOUS CURCULIONIDS

Summary:

Because of increasing standards of cleanliness and freedom from infestation the presence of live "non-pest" or incidental species in wheat at receival has caused concern and rejection of some deliveries. Desiaptha maculata Blackb. and Sitona humeralis Steph. (Fam. Curculionidae) can occur in harvested grain. The susceptibility of these and 3 other common Curculionids, to maldison applied at wheat at the rate of 8 ppm was assessed.

D. maculata was killed by 8 ppm maldison within 4 days, S. humeralis was killed in 2 to 3 days so that low numbers of live insects of these species in grain to be treated with maldison, should be no serious objection. Other curculionids appear to be susceptible to maldison grain treatment.

THE TOXICITY OF MALDISON ON WHEAT TO VARIOUS CURCULIONIDS

Introduction:

During recent years world trade has demanded ever increasing standards of cleanliness and freedom from infestation in cereals. The undesirability of insects in grain has been given a great deal of publicity and grain has been subject to closer and closer scrutiny at receival depots. Export standards have decreased from:-

> one primary or two secondary grain pests in a $\frac{1}{2}$ gallon sample in 1963 to:-
>
> one insect in a $\frac{1}{2}$ gallon sample in 1966.

These standards were established with reference originally to grain pests, but they are now interpreted literally by South Australian Co-operative Bulkhandling Ltd., to mean any insect whatsoever. Most "incidental" insects which are picked up during harvesting time are dead on arrival at receival depots and so must logically be considered as inert foreign matter and the grain subject to rejection on this basis, remembering also that dead insect bodies generally break-up and disappear in the course of normal grain handling.

When live "incidental" insects occur in grain at receival depots, the problem is a little more complex. Most insects would be expected to survive for only a short time, but others, such as some of the Curculionidae have adults capable of relatively long periods of inactivity, and so might survive long enough to be alive when the grain is finally sold. Practically all grain received in South Australia is immediately treated with 12 ppm of maldison. Grain received at Pt. Adelaide is treated with 8 ppm of maldison. This treatment could be lethal to many "incidental" insects.

In 1966 the silo manager at Yeelanna on Eyre Peninsula rejected grain from several farmers because of the presence of live Desiantha maculata Blackb. (Curculionidae) adults. Although D. maculata adults damage immature grain in the head (Allen 1968, Jrn. of Agric. S.A. 71:435) they do not damage or breed in stored grain, and so must be considered as "incidental" insects.

In 1967 the silo manager at Farrell Flat similarly rejected wheat from one farmer because of live D. caudata Pasc.

Again in 1968 the silo manager at Edillilie on Eyre Peninsula rejected wheat because of D. maculata, and possibly Listroderes costirostris Schonh.(fam. Curculionidae). Following discussions with South Australian Co-operative Bulkhandling it was considered reasonable to accept low levels of contamination with D. maculata if it could be shown that the maldison treatment would kill them. At the same time several other common curculionids were included in the tests.

Methods

Two samples of wheat were obtained from South Australian Co-operative Bulkhandling, Pt. Adelaide, on 17th December, 1968. One sample was collected from a farmer's truck at the receival grid and had not been treated with maldison by the farmer or South Australian Bulkhandling Co-operative. The second sample was collected at the end of the chute leading to the storage cell and consisted of wheat treated with 8 ppm maldison. The wheat samples were divided into one quart sized tin cans with tight fitting lids and insects added as they became available.

On 17th December, 20 adult Sitona humeralis Steph. (fam. Curculionidae) collected from Northfield were placed in each of 5 cans of treated and 5 cans of untreated wheat. A recent introduction to South Australia, this insect was currently very numerous and had been noticed in harvested grain.

At the same time, 20 D. maculata collected from Northfield were placed in a can of treated and another 20 in a can of untreated wheat.

Eleven live Otiorrhynchus cribricollis Gyll. (fam. Curculionidae) were also available at that time and were put into treated wheat. This species would not be likely to occur in harvested grain because it is normally inactive among debris on the ground during the day and any adults on plants would be expected to drop to the ground in response to vibrations at the approach of harvesting machinery.

Eleven live Ethemaia sellata Pasc. (fam. Curculionidae) were also availabel at the same time and these were put into a can of treated wheat. This species is common, especially following infestations of Cape weed. Although not known to occur in harvested grain, it is sometimes locally so very abundant that contamination might occur.

On December 19th specimens were received air freight from Edillilie. Two more cans of treated wheat and two cans of untreated wheat were set up with 20 live D. maculata in each, and the remaining 26 D. maculata were divided equally between a can of treated and a can of untreated wheat.

Samples of 24 Listroderes costirostris from Edillilie were placed in each of three cans of treated and three cans of untreated wheat, but it often occurs in very large numbers on cereal farms on Lower Eyre Peninsula and could occur in harvested grain.

A further collection of 14 live O. cribricollis from Modbury was obtained on December 19th and half were put into each treated and untreated wheat.

Samples were inspected daily and the numbers of weevils surviving was determined.

Results:

Numbers of Insects Alive

In Treated Wheat

In Untreated Wheat

Desiantha maculata

Day	0	1	2	3	4
	20	16	7	3	0
	20	14	1	0	0
	20	6	0	0	0
	13	12	6	0	0
TOT-AL	73	48	14	3	0

0	1	2	3	4	Source of Insects
20	19	19	19	19	Northfield
20	19	19	17	-	Edillilie
20	20	19	18	-	Edillilie
13	13	12	12	-	Edillilie
73	71	69	66	-	

Sitona humeralis

Day	0	1	2	3	4	5
	20	1	0	0	0	0
	20	15	10	4	2	0
	20	1	0	0	0	0
	20	0	0	0	0	0
	20	00	0	0	0	0
TOT-AL	100	17	10	4	2	0

0	1	2	3	4	5	Source of Insects
20	20	20	20	19	19	Northfield
20	20	20	20	20	19	Northfield
20	20	20	20	20	19	Northfield
20	20	20	20	18	17	Northfield
20	20	20	20	20	20	Northfield
100	100	100	100	97	94	

Listroderes costirostris

Day	0	1	2	3	4	15
	24	19	18	14	9	1
	24	24	16	12	6	0
	24	23	19	15	12	1
TOT-AL	72	66	53	41	27	2

0	1	2	3	4	15	Source of Insects
24	22	21	21	21	9	Edillilie
24	24	24	24	22	12	Edillilie
24	24	24	22	22	14	Edillilie
72	70	69	67	65	35	

Numbers of Insects Alive

In Treated Wheat

Otiorrhynchus cribricollis

Day	0	1	2	3	4	5	15
	11	6	1	1	0	0	0
	7	7	7	6	2	1	0

In Untreated Wheat

0	1	2	3	4	5	15	Source of Insects
-	-	-	-	-	-	-	Northfield
7	7	7	7	7	7	7	Modbury

Ethemaia sellata

Day	0	1	2	3	4	5	6	16	Source of Insects
	8	4	5	3	3	3	3	1	Northfield

Conclusions:

Desiantha maculata. Live adults occuring in harvested wheat are killed within four days by maldison applied to wheat at the rate of 8 ppm. Low numbers of live adults could be safelty accepted in grain receivals with the expectation that subsequent maldison treatments will kill them within four days.

Sitona humeralis. Live adults occuring in harvested wheat are killed within about 48 hours by maldison applied to wheat at the rate of 8 ppm. The slower rate in one replicate may have been due to grain containing less maldison, although every effort was made to ensure thorough mixing. Even in this sample however, all insects were killed in 5 days.

Low numbers of Sitona weevils in grain could be accepted with the expectation that subsequent maldison treatment will kill them within 2 or 3 days.

Listroderes costirostris. Although not carried through to completion, a considerable proportion were killed by 8 ppm of maldison in 4 days and at the end of 15 days when natural mortalities were becoming common, only 2 adults of 72 survived in the treated grain and these might be expected to die soon after.

Similarly the presence of low numbers of live L. costirostris would appear to be no serious objection to accepting grain to be treated with maldison.

Otiorrhynchus cribrocollis & Ethemaia sellata.
Although the results were inadequate to form a conclusion they suggest a high mortality of O. cribricollis. The death rate of E. sellata was slower and might have been due more to "natural" causes rather than maldison.