

**FINAL REPORT TO:
THE AGRICULTURAL RESEARCH FOUNDATION FOR 1997**

TITLE: Bean Mold Scouting Program

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Objectives:

To reduce bean mold scouting effort and increase the value of the information produced by the scouting effort.

To validate that the modified scouting program produces an accurate assessment of risk of mold development.

Background:

The market for canned and frozen snap beans is very competitive. Moldy bean are difficult to separate from healthy beans in the processing plant. They reduce the quality and value of the entire pack. Growers can not afford to under spray plantings that are at high risk of developing mold. Scouting results suggest that about 20 % of the plantings studied during the 1996 growing season were at high risk of mold.

Although snap beans are a high value crop to Willamette Valley vegetable growers, they are like most processing vegetables a relatively low margin crop. Ronilan sprays cost about 25\$ each. Growers can not afford to apply unneeded second sprays on low risk plantings.

The goal of the bean mold scouting program is to identify high and low risk plantings. At the 1st spray decision, the scouting program provides information that helps the grower to answer the following questions:

- Is this a high risk planting? Should I plan to *spray the field twice*?
- Is this a low risk planting? Can I use a more economical *one-spray program*?

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- If I have decided to go with a one spray program should I apply the single spray *at early bloom or wait* a couple of days so that the single spray covers the high risk period at canopy closure?
- Should I mix Sevin and Ronilan for the first spray?
- Will this planting be highly *responsive to irrigation cut-off timing*?
- Is this planting at a greater *risk of heat-induced split* set than mold development? Should I irrigate throughout the day to cool the field?

At the *second spray decision* the scouting program provides information that helps the grower to answer the following questions:

- Should I *apply a second spray*? Should I use both Ronilan and Sevin?
- Is secondary mold infection spreading rapidly through the field? Should I plan, if possible, to *harvest this field early*?

During the 1997 growing season, 19 farms participated in the scouting program:

<u>Farm</u>	<u>Area</u>	<u>Farm</u>	<u>Area</u>
Bartosz	Aumsville	Hendricks	Scio
Belden	Aumsville	Kenagy	Albany
Brice	Junction City	Kraemer	Mt. Angel
Chase	Coburg	Landrith	Keizer
Chambers	Talbot	Laube	Jefferson
Coleman	St. Paul	Meyers	Talbot
Detering	Junction City	Winn	Corvallis
Ediger	Dayton	Zielinski	Keizer
Edwards	Junction City		
Haley	Lebanon		
Harper	Eugene		

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Results:

The scouting procedure integrates risk scores associated with field history, history of mold problems, variety, and the discovery of white mold apothecia and gray mold point sources. The strongest predictors of mold are weather and field history.

- ◆ **If a field has a history of mold problems, apply two sprays. Apply the first fungicide spray at early bloom, when 5 to 10 percent of the plants have one blossom open. Apply a second spray 7 days later.**

There is some confusion about what is meant by early bloom. We are developing procedures for counting blossoms per row foot to standardize the spray timing recommendation. Some growers may be waiting too long to apply their 1st spray in a 2 spray program. If the decision has been made to apply two fungicidal sprays, the planting is by definition, a high risk planting. This implies further that there are spores present during early bloom. There is very little "kick back" with most of the fungicides available for mold control in beans. There is very little curative effect.

- ◆ **In a two spray program, apply the first fungicide spray early. Don't wait.**

The discovery of sporulating apothecia is the most labor intensive aspect of the scouting procedures. The OSU scouting program leans heavily on this procedure. Originally, many scouting visits (up to 6 visits per planting) were recommended in order to assure that if apothecia were present, they were discovered. In order to reduce scouting effort, we shortened the program. We find that this has weakened the program. In 1997, we had an occasional planting where no apothecia were discovered, yet there was significant mold. Conversely, we had occasional plantings where apothecia were discovered but mold did not develop (Table One and Two).

The scouting program is good at detecting very low risk plantings. It is good at detecting very high risk plantings. There is, however, a large gray area. The most problematic fields in 1997 were infected with gray mold, not white mold. When gray mold occurs, the weather patterns are high risk. The occurrence of gray mold indicates that there is high relative humidity, poor air movement, and probably dew on the ground in the morning. The presence of gray mold is a useful indicator that the growing area is in a high risk pattern and everyone should be cautious.

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- ◆ **When gray mold is active, it is an indicator that weather, relative humidity, and air movement are conducive to mold. All plantings should be treated as high risk plantings when gray mold is detected in a growing area.**

The sweep net procedure for determining risk of 12 spot beetle damage (data not reported here) is in use and has enough value that ag professionals are using the data. We began to experiment with the use of yellow sticky cups laced with feeding attractant as an alternative procedure which reduces labor. Perhaps, we could detect regional trends in 12 spot beetle activity through a monitoring program.

Even though we have shortened our scouting procedures to the point that we are having problems with their accuracy and sensitivity, there still was little enthusiasm among most ag chemical field representatives that we worked with for implementing the scouting procedures.

We should attempt to develop a risk of mold monitoring program that forecasts risk on a growing region basis and uses less field scouting. A monitoring program could involve weather data gathered from logical bean growing areas around the Willamette Valley, an adaptation of the computer models that project risk of mold for snap beans, and a limited amount of field scouting to validate the risk model. Risk of mold forecasts could be broadcast over a variety of media.

Table One:

Planting ID#	Variety	Planting Date	Scouting Visits	# Apothecia	GM points per 15ft	Base Risk	Risk Score 1st spray	Risk Score 2nd spray	Ronilan 1st spray	Ronilan 2nd spray	Harvest Date	Yield T/A	% mold average	% mold range
K4	OR91G	21-May	3	0	7	0	13	13	10-Jul	21-Jul	3-Aug	9.81	0	0
K5	OR91G	22-May	3	0	8	0	13	13	10-Jul	21-Jul	2-Aug	9.32	0.07	0-.5
K6a	OR91G	26-May	3	0	5	0	13	13	10-Jul	21-Jul	1-Aug	7.46	0.02	0-.4
K6b	OR91G	27-May	2	0	0	2	10	13	16-Jul	none	1-Aug	7.46	0.02	0-.4
K7	OR91G	10-Jun	3	0	2.75	0	11	13	24-Jul	none	12-Aug	8.47	0.02	0-.4
K8	OR91G	6-Jun	4	0	0	0	5	8	none	none	14-Aug	7.57	0	0
K9	Romano	16-Jun	3	0	0	3	11	11	30-Jul	3-Aug	20-Aug	7.63	0.57	na
K10	OR91G	20-Jun	3	0	0	2	10	na	4-Aug	none	21-Aug	8.93	0	0
K11	OR91G	20-Jun	4	0	<1	0	9	9	30-Jul	8-Aug	na	na	na	na
C1	OR91G	23-May	3	0	9	0	13	14	12-Jul	none	29-Jul	9.74	0.28	0-1.1
C2a	OR91G	10-Jun	4	4	1	0	14	16	24-Jul	none	12-Aug	8.12	0.05	0-.7
C2b	OR91G	10-Jun	3	2	3	0	16	17	24-Jul	none	12-Aug	8.12	0.05	0-.7
BR1	OR91G	17-Apr	2	0	0	2	6	8	13-Jun	none	27-Jul	10.3	0.61	.24-1.52
BR2	OR5402	9-May	1	0	0	0	4	na	2-Jul	12-Jul	5-Aug	10.0	0.46	.04-1.36
BR3	OR5402	29-May	3	0	2	2	6	12	14-Jul	none	17-Aug	9.4	na	na
BR4	Roma II	7-Jun	3	0	0	5	10	10	12-Jul	22-Jul	14-Aug	5.1	0.50	0-1.2
BR5	Roma II	13-Jun	na	na	na	na	na	na	22-Jul	5-Aug	19-Aug	na	0.60	.3-8
BR6	OR5402	14-Jun	2	0	0	2	8	10	28-Jul	8-Aug	24-Aug	8.4	0.40	.1-1.0
BR7	OR91G	21-Jun	3	0	3	2	7	10	5-Aug	12-Aug	3-Sep	8.8	0.40	.1-8
BR8	OR91G	30-Jun	3	0	3	2	7	15	12-Aug	20-Aug	13-Sep	8.2	0.06	0-.12
CH1	OR91G	12-Apr	2	0	5	0	9	10	7-Jun	16-Jun	1-Jul	9.6	2.70	0.6-4.3
CH2	OR91G	26-Apr	3	0	2	12	17	20	13-Jun	24-Jun	9-Jul	11.4	1.70	.3-3.8
CH3	OR91G	3-May	2	0	0	10	15	18	19-Jun	28-Jun	9-Jul	na	na	na
CH4	OR5402	20-May	3	0	3	12	16	17	7-Jul	14-Jul	2-Aug	12.5	1.70	0.2-3.1
CH5	OR5402	22-May	2	0	5	12	16	20	8-Jul	17-Jul	5-Aug	na	1.30	0.4-2.2
CH6	OR5402	29-May	na	na	na	na	na	na	15-Jul	21-Jul	18-Aug	na	0.70	0.04-3.4
CH7	Romano	6-Jun	na	na	na	na	na	na	18-Jul	25-Jul	11-Aug	na	1.30	0.2-3.8
CH8	OR5402	13-Jun	2	0	2	0	0	8	25-Jul	31-Jul	11-Aug	na	na	na
CH8	OR5402	13-Jun	2	0	2	0	0	10	na	na	na	na	na	na
CH8	OR5402	13-Jun	2	0	2	0	0	10	na	na	na	na	na	na
DE4	OR91G	1-Jul	2	0	2	2	8	12	8-Aug	15-Aug	3-Sep	na	0.50	0.3-0.8
HA1	OR91G	12-Apr	2	0	0	2	5	6	9-Jun	none	1-Jul	na	0.40	0.2-0.7
HA3	OR5402	9-Jun	2	0	0	2	5	10	21-Jul	none	13-Aug	na	0.10	0.04-0.3

Table Two:

Planting ID#	Planting Date	Plot ID#	Special Treatment	Ronilan Program	Sevin Program	Risk Score#1	Risk Score#2	Plot ID#	Wh.Plt count	Wh.Plt %WM	Wh.Plt %GM	Bean Pod count	Pods %WM	Pods %GM	Pods %BB
A2a	10-May	N	15"	0	0	10	10	N	60	48.3	6.7	140	12.9	2.1	3.6
A2a	10-May	S	15"	0	0	10	10	S	60	1.7	1.7	117	0.0	0.0	8.6
A2a	10-May	N	15"	1	1	10	10	N	57	8.8	0.0	110	0.0	0.0	3.6
A2b	10-May	N	30"	0	0	8	10	N	107	12.2	3.7	114	4.4	1.8	7.0
A2b	10-May	S	30"	0	0	8	10	S	92	0.0	0.0	138	0.0	0.0	8.7
A2b	10-May	N	30"	1	1	8	10	N	97	7.2	6.2	117	0.0	0.9	0.0
A4	27-May	S	30"	0	0	10	15	S	103	0.0	0.0	105	0.0	0.0	3.8
A4	27-May	N	30"	0	0	10	15	N	95	0.0	4.2	90	0.0	0.0	0.0
A4	27-May	N	30"	1	1	10	15	N	95	2.1	1.0	96	0.0	0.0	1.0
C2	10-Jun	A		0	0	16	17	A	79	13.9	1.3	76	0.0	0.0	4.0
C2	10-Jun	C		1	1	16	17	C	78	6.4	2.6	100	4.0	0.0	3.0
C2	10-Jun	E		0	0	16	17	E	72	5.6	0.0	100	0.0	0.0	4.0
C2	10-Jun	D		2	2	16	17	D	58	0.0	0.0	98	0.0	0.0	4.1
C2	10-Jun	B		0	0	14	16	B	63	79.4	0.0	140	15.7	0.0	3.6
C2	10-Jun	A		2	2	14	16	A	65	7.7	0.0	95	1.1	0.0	3.2
C2	10-Jun	F		0	0	14	16	F	75	62.7	1.3	104	6.7	0.0	2.9
C2	10-Jun	G		1	1	14	16	G	72	34.7	1.4	110	0.0	0.0	9.1
C2	10-Jun	E		2	2	14	16	E	79	6.3	1.3	100	1.0	0.0	2.0
C2	10-Jun	D		1	1	14	16	D	79	63.3	0.0	104	7.7	0.0	2.9
C2	10-Jun	C		2	2	14	16	C	62	4.8	0.0	102	0.0	0.0	0.0
K5	22-May			1	1	13	13		54	1.9	1.9	113	0.0	0.0	5.3
K5	22-May			2	2	13	13		58	1.7	0.0	96	0.0	0.0	2.1
K8	13-Jun			0	0	5	8		49	0.0	4.1	92	0.0	0.0	4.4
K8	13-Jun			1	1	5	8		67	0.0	3.0	144	0.0	0.0	3.5

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Table Two:

Planting ID#	Planting Date	Plot ID#	Special Treatment	Ronilan Program	Sevin Program	Risk Score#1	Risk Score#2	Plot ID#	Wh.Plt count	Wh.Plt %WM	Wh.Plt %GM	Bean Pod count	Pods %WM	Pods %GM	Pods %BB
K10	20-Jun			0	0	7	10		58	0.0	0.0	103	0.0	0.0	6.8
K10	20-Jun			1	1	7	10		55	0.0	0.0	105	0.0	0.0	8.6
K9	16-Jun			0	0	11	11		60	5.0	3.3	112	2.7	0.0	0.0
K9	16-Jun			1	1	11	11		65	3.1	4.6	100	2.0	1.0	0.0
K9	16-Jun			2	2	11	11		56	3.6	0.0	100	2.0	0.0	1.0
K11	26-Jun			0	0	11	11		59	0.0	1.7	104	0.0	0.0	1.0
K11	26-Jun			0	0	11	11		43	0.0	0.0	107	0.0	0.0	0.0
K11	26-Jun			1	1	11	11		50	0.0	0.0	81	0.0	0.0	2.5
D2	14-Jun			0	0	6	na		79	1.3	0.0	108	0.0	0.0	8.3
D2	14-Jun			1	1	6	na		56	0.0	0.0	97	0.0	0.0	1.0
D3	3-Jul			0	0	8			80	0.0	0.0	109	0.0	0.0	0.0
D3	3-Jul			1	1	8			79	0.0	0.0	103	0.0	0.0	1.9
D4	10-Jul			0	0	4			64	0.0	23.4	105	0.0	0.0	1.0
D4	10-Jul			1	1	4			67	0.0	7.5	100	0.0	0.0	1.0
L1	1-Jul			0	0	9			45	2.2	0.0	106	0.0	0.0	5.7
L1	1-Jul			1	1	9			32	0.0	0.0	101	0.0	0.0	1.0
L2	7-Jul			0	0	8	8		73	0.0	1.4	115	0.0	0.0	0.9
L2	7-Jul			1	1	8	8		77	1.3	0.0	113	0.9	0.0	0.9
B1	5-May	N	7.5"	0	0	18	18	N	33	51.5	6.1	101	5.0	0.0	2.0
B1	5-May	S	7.5"	0	0	18	18	S	20	40.0	10.0	112	7.1	0.0	7.1
B1	5-May	N	7.5"	1	1	18	18	N	23	30.4	0.0	133	0.0	0.0	0.8
B1	5-May	S	7.5"	1	1	18	18	S	24	4.2	0.0	135	0.0	0.0	0.0
B1	5-May	N	15"	1	1	18	18	N	48	6.3	4.2	120	0.0	0.0	2.5
B1	5-May	S	15"	1	1	18	18	S	34	0.0	0.0	152	0.7	0.0	1.3

Table Two:

Planting	Planting	Plot	Special	Ronilan	Sevin	Risk	Risk	Plot	Wh.Plt	Wh.Plt	Wh.Plt	Bean Pod	Pods	Pods	Pods
ID#	Date	ID#	Treatment	Program	Program	Score#1	Score#2	ID#	count	%WM	%GM	count	%WM	%GM	%BB
B1	5-May	N	15"	0	0	18	18	N	27	96.3	0.0	125	14.4	0.0	1.6
B1	5-May	N	15"	0	0	18	18	N	52	34.6	11.5	95	8.4	1.1	2.1
B1	5-May	S	15"	0	0	18	18	S	42	11.9	2.4	128	0.8	0.0	3.1
B1	5-May	S	15"	0	0	18	18	S	36	38.9	2.8	180	2.2	0.0	0.6
B1	5-May	N	30"	0	0	18	18	N	71	33.8	15.5	143	2.8	0.0	1.4
B1	5-May	S	30"	0	0	18	18	S	79	49.4	5.1	111	10.8	0.0	0.9
B1	5-May	N	30"	1	1	18	18	N	68	0.0	0.0	133	0.0	0.0	0.0
B1	5-May	S	30"	1	1	18	18	S	70	1.4	1.4	125	0.0	0.0	0.0
B3	24-May	E		0	0	27	28	E	63	11.1	0.0	106	2.8	0.0	3.8
B3	24-May	W		0	0	27	28	W	92	18.5	0.0	110	4.6	0.0	3.6
B3	24-May	E		1	1	27	28	E	92	1.1	1.1	93	0.0	0.0	2.2
B4	2-Jun	A	tillage A	0	0	11	21	A	71	1.4	0.0	96	0.0	0.0	5.2
B4	2-Jun	A	tillage A	1	1	11	21	A	76	1.3	0.0	111	0.9	0.0	1.8
B4	2-Jun	B	notill B	0	0	8	10	B	84	4.8	0.0	114	0.9	0.0	3.5
B4	2-Jun	B	notill B	1	1	8	10	B	86	0.0	1.2	110	0.0	0.0	0.0
B4	2-Jun	C	tillage C	0	0	11	21	C	72	9.7	1.4	103	1.0	1.0	3.9
B4	2-Jun	A	tillage A	1	1	11	21	A	76	1.3	0.0	11	0.9	0.0	1.8
B5	13-Jun			0	0	22	23		37	37.8	0.0	103	7.8	0.0	2.9
B5	13-Jun	E		1	1	22	23	E	33	0.0	0.0	104	0.0	0.0	1.0
B5	13-Jun	E		2	2	22	23	E	56	1.8	0.0	100	0.0	0.0	1.0
B5	13-Jun	W		1	1	22	23	W	55	5.5	3.6	103	0.0	0.0	0.0

Snap Bean Scouting Project 1997

*OSU Integrated Plant Protection Center and the Oregon Processed Vegetable Commission cooperating.
For more information contact Dan McGrath, OSU Extension (503) 931-8307*

Grower _____ Field Name _____ Plant Date _____

<u>CROP HISTORY:</u> Beans or other susceptible crops grown in the past 5 yr. One time - score = 2 ; Two times - score = 4; Three or more times - score = 6;					<u>Scores</u>
1996	1995	1994	1993	1992	
<u>HISTORY OF MOLD PROBLEMS:</u> Yes No		Mold has been a problem one or more times in past bean plantings - score = 10			
<u>VARIETY:</u>		Romanos - score = 3 Others - score = 0			
<u>BASE SCORE</u>		Crop History Score plus Mold History Score plus Variety Score equals base score			Total:

Drawing of Field plus Surroundings - Indicate Three Scouting Areas Within Field

Snap Bean Scouting Project 1997 *OSU Integrated Plant Protection Center and the Oregon Processed*

Vegetable Commission cooperating.

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Grower _____ **Field Name** _____ **Plant Date** _____

MOISTURE CONDITIONS:

Cool, wet weather at early bloom - score = 3; Afternoon or evening irrigation during bloom - score = 1,

More than 2 irrigations between 1st and 2nd spray decision - score = 3,

Score: _____	Score: _____	Score: _____	Score: _____	Score: _____
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CANOPY CLOSURE:

More than 18 inches "open" between rows - score = 0; 13 to 18 inches "open" between rows - score = 3

8 to 12 inches "open" between rows - score = 4 ; Less than 8 inches "open" between rows - score = 5

Inches: _____	Inches: _____	Inches: _____	Inches: _____	Inches: _____
Score: _____	Score: _____	Score: _____	Score: _____	Score: _____

PRE BLOOM GRAY MOLD POINT SOURCE COUNTS:

Prior to 1st bloom, the highest daily average count of visibly sporulating gray mold "point source" per 15 row feet:

1 to 2 - score = 2; 2 to 10 - score = 5; More than 10 - score = 8

Ave. Count: _____	Ave. Count: _____	Ave. Count: _____	Ave. Count: _____	Ave. Count: _____
Score: _____	Score: _____	Score: _____	Score: _____	Score: _____

APOTHECIA COUNTS (Grand Total):

Score Apothecia counts using the total number or grand total found on all sample dates

None - score = 0; 0 to 2 - score = 3 to 5 - score = 6, More than 6 - score = 10

Count: _____	Count: _____	Count: _____	Count: _____	Count: _____
Score: _____	Score: _____	Score: _____	Score: _____	Score: _____

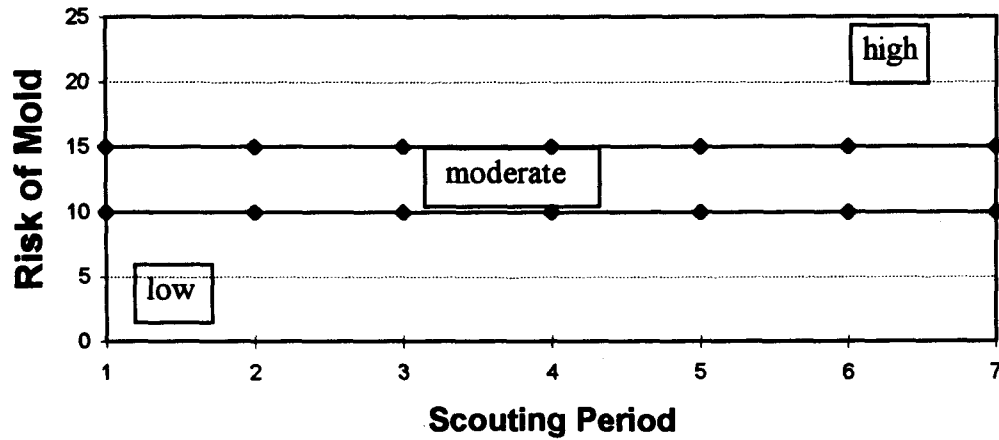
TOTAL SCORES

<u>Date</u>	<u>Date</u>	<u>Date</u>	<u>Date</u>	<u>Date</u>
Base	Base	Base	Base	Base
Moisture	Moisture	Moisture	Moisture	Moisture
Canopy	Canopy	Canopy	Canopy	Canopy
Gray Mold	Gray Mold	Gray Mold	Gray Mold	Gray Mold
Apothecia	Apothecia	Apothecia	Apothecia	Apothecia
Total Score:	Total Score:	Total Score:	Total Score:	Total Score:

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Grower _____ Field Name _____ Plant Date _____



Date	Action	Recommendation
		High Risk - Stop scouting. A two-spray fungicide program is needed. Apply first spray at early (5% to 10% bloom). Apply second spray 7 to 10 days later.
		Moderate Risk - Continue scouting. A one or two-spray fungicide program may be used depending on weather and other risk factors. Apply first spray at early bloom. A second spray decision will be required prior to the pre harvest application interval.
		Low Risk - Continue scouting. A one-spray fungicide program should be adequate. The spray may be delayed until scouting indicates increased risk, the weather changes or apothecia are discovered. Apply a single spray now or at canopy closure.
		Risk of split set - This field is at high risk of heat induced split set. If possible, irrigate in multiple short sets throughout the day to cool the field. Scout for mold and modify fungicide spray program as needed.
		Irrigation Management - This field is not at risk of split set. The field should be highly responsive to irrigation cut-off timing. Cut off irrigation in the early afternoon, in time for the foliage to dry out prior to nightfall.
		12 Spot Beetle Pressure - This field has exceeded the action threshold for controlling Diabrotica beetle damage. Apply insecticide. Count/20 sweep = _____
		Harvest timing - Secondary mold infection is spreading rapidly through this field. If possible, harvest early.
		Second Spray Recommendation:
		Notes: