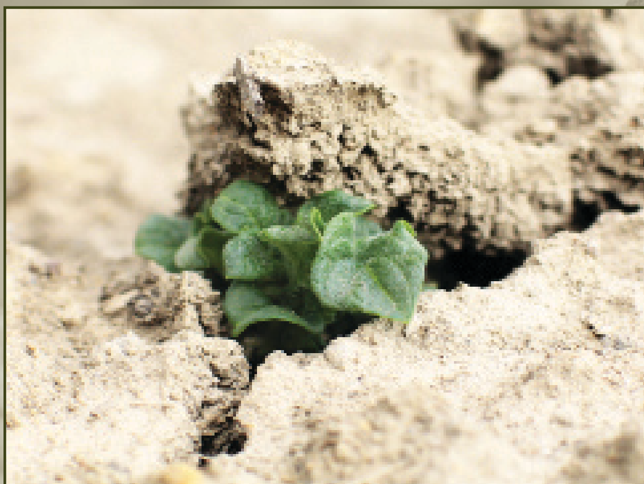
MP-122-2007



2007

RESEARCH AND EXTENSION PLANT PATHOLOGY FIELD CROP DISEASE SURVEYS

Compiled by G.D. Franc and W.L. Stump
University of Wyoming
Department of Plant Sciences

UNIVERSITY OF WYOMING

2007
University of Wyoming
Research and Extension Plant Pathology
Field Crop Disease Surveys

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2007 Southeastern Wyoming and Western Nebraska Winter Wheat Survey

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Field sites were visited on May 31 and June 4-6 , 2007. Crop specialists from the University of Nebraska-Lincoln and the University of Wyoming participated in the survey. University of Wyoming participants were Gary Franc (extension plant pathologist), William Stump (research scientist), and Jack Cecil (research scientist). UNL participants were Stephen Wegulo (extension plant pathologist), Gary Hein (entomologist), Drew Lyon (extension dryland specialist), Robert Harveson (plant pathologist), and William Booker (extension educator).

NW Nebraska (June 4, 5, 2007):

The 2007 winter wheat survey in western Nebraska was conducted on June 4 and June 5 by a group of crop specialists and educators from the University of Nebraska-Lincoln, the University of Wyoming, and Texas A&M University.

Some areas in the Panhandle were severely impacted by the presence of wheat streak mosaic virus. The wheat streak severity in these areas could be traced back to inadequately controlled volunteer wheat in areas that had received pre-harvest hail in 2006. Due to the warm conditions experienced at times in the spring, the impact of the wheat streak was maximized in these infestations.

Spotty infestations of Russian wheat aphid and other cereal aphids were seen but none were at economic levels. Barley yellow dwarf presence resulting from earlier cereal aphid infestations were seen in a few fields but was not significant in any of the fields observed.

Other diseases observed were take-all, tan spot, stripe rust, and loose smut. Symptoms of an unidentified condition also were observed and were most pronounced on cultivar Hatcher.

In general, dry and hot conditions in the Panhandle posed a greater risk to crop yield than diseases.

Wyoming (Nineteen fields visited on May 31, and June 5 and 6, 2007):

Wyoming Summary: In Wyoming on May 31, and June 5 and 6, the winter wheat crop in Goshen and Laramie counties was generally healthy with the greatest impacts to yield this season anticipated to be moisture related, including the lack of timely rains. We did observe wheat streak mosaic and barley yellow-dwarf virus infected plants at various locations with some indications of prior cold-temperature injury and foliar feeding injury, probably resulting from black-bugs.

Isolated Russian wheat aphid was observed with none of the infestations deemed to be economic in terms of pest management. Powdery mildew, stripe rust, tan spot and a presumptive bacterial disease were observed under irrigation and/or where moisture levels were elevated. Once again, the major impact on yield this season will be moisture related. In summary for Wyoming, water availability (lack of timely and sufficient rain) will limit production this year, with relatively little yield effects due to disease or other pests. Specific survey information can be found in Table 1.

Table 1. A portion of the wheat survey results (not all Nebraska results shown), May 31 and June 5, 6, 2007 (G.D. Franc, W.L. Stump and J.T. Cecil, U of WY; 2007).

Internal lab #	Date	GPS Position		location	county	state	crop	DIAGNOSIS
2007.159	31-May-07	N42.10287	W104.38313	SARAC	Goshsen	WY	winter wheat	drought stress, thin stand
2007.160	31-May-07	N42.10318	W104.38897	SARAC	Goshsen	WY	winter wheat	drought stress, vol rye, herbicide injury, thin stand
2007.161	31-May-07	N42.10322	W104.39605	SARAC	Goshsen	WY	winter wheat	insect injury
2007.162	5-Jun-07	N41.89239	W103.68080	NE panH station	Scottsbluff	NE	winter wheat	Wheat streak mosiac virus, WSMV research plot
2007.163	5-Jun-07	N41.48265	W102.86799	N. of Gurley	Morrill?	NE	winter wheat	Take-all, 5th year of continuous wheat
2007.164	5-Jun-07	N41.23579	W102.98301	Near Gurley	Cheyenne	NE	winter wheat	wheat streak mosiac virus, stripe rust
2007.165	5-Jun-07	N41.23576	W103.00916	Sydney station	Cheyenne	NE	winter wheat	stripe rust, loose smut, Russian wheat aphid
2007.166	5-Jun-07	N41.07117	W104.06636	S. of Pine Bluff	Laramie	WY	winter wheat	tan spot, insect injury, barley yellow dwarf virus
2007.167	5-Jun-07	N41.06144	W104.06433	S. of Pine Bluff	Laramie	WY	winter wheat	tan spot, insect injury, barley yellow dwarf virus
2007.168	5-Jun-07	N41.25851	W104.08331	N. of Pine Bluff	Laramie	WY	winter wheat	insect injury, blackbug?
2007.169	5-Jun-07	N41.27256	W104.10003	N. of Pine Bluff	Laramie	WY	winter wheat	downy brome, UW variety trial
2007.170	5-Jun-07	N41.37037	W104.21458	N. of Pine Bluff	Laramie	WY	winter wheat	no problems seen, irrigated UW variety trial
2007.171	6-Jun-07	N42.13195	W104.39701	SARAC	Goshsen	WY	winter wheat	bird-cherry oat aphid, loose smut, stripe rust, powdery mildew, WSMV
2007.172	6-Jun-07	N42.13176	W104.40114	SARAC	Goshsen	WY	spring wheat	unknown bacterial infection
2007.173	6-Jun-07	N42.12978	W104.40110	SARAC	Goshsen	WY	spring barley	unknown bacterial infection, barley variety trial
2007.174	6-Jun-07	N42.12893	W104.40113	SARAC	Goshsen	WY	spring grains	unknown bacterial infection
2007.175	6-Jun-07	N42.09233	W104.38315	SARAC	Goshsen	WY	winter wheat	drought stress, jointed goatgrass
2007.176	6-Jun-07	N41.87866	W104.36281	Base of bluff	Goshsen	WY	winter wheat	drought stress, jointed goatgrass
2007.177	6-Jun-07	N41.87892	W104.36318	Base of bluff	Goshsen	WY	winter wheat	herbicide injury, vol rye, russian wheat aphid
2007.178	6-Jun-07	N41.87232	W104.40948	Base of bluff	Goshsen	WY	winter wheat	heavy vol rye, loose smut
2007.179	6-Jun-07	N41.87164	W104.64988	top of chugwater	Goshsen	WY	winter wheat	jointed goatgrass, insect injury
2007.180	6-Jun-07	N41.84973	W104.74991	top of chugwater	Goshsen	WY	winter wheat	no problems seen
2007.181	6-Jun-07	N41.73215	W104.72655	top of chugwater	Goshsen	WY	winter wheat	a little tan spot, UW variety trial

University of Wyoming Research and Extension
Plant Pathology Field Crops Disease Survey

2007 Cercospora Survey Results: Fungicide Sensitivity Characteristics of *Cercospora beticola* Isolates Recovered from Infected Sugar beet in the High Plains of Colorado, Montana, Nebraska, and Wyoming

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Abstract

The 2007 Cercospora leaf spot survey tested the fungicide reaction of 239 *Cercospora beticola* isolates recovered from 52 fields: 8 fields from CO, 10 fields from MT, 30 from NE, and 4 fields from WY. All isolates were tested for sensitivity to benzimidazole (Benlate®, Topsin®), triphenyltin hydroxide (Super Tin®, Agritin®), tetraconazole (Eminent®), propiconazole (Tilt®), azoxystrobin (Quadris®), trifloxystrobin (Gem®) and pyraclostrobin (Headline®). Only benzimidazole had appreciable insensitivity observed; 52 percent of the fields surveyed had detectable levels of benzimidazole insensitivity. Historical trends for High Plains surveys initiated in 1998 revealed that fields with benzimidazole insensitivity increased from 26 percent in 1998 to 80 percent in 2003, followed by a three year decline to 45 percent in 2005. Results consistently reveal that benzimidazole insensitivity is still widespread in High Plains sugar beet fields. Therefore, reliance on benzimidazole or thiophanate-methyl for Cercospora leaf spot suppression is not advised. Isolate reaction to diethofencarb in 2004-2007 revealed that all isolates insensitive to benzimidazole were sensitive to diethofencarb (negative cross resistance), indicating the likely presence of a single (and previously described) mutation conferring benzimidazole resistance.
Results for 2007 did not have the intermediate reaction to benzimidazole as in 2006, with only 2 isolates with a intermediate reaction (between 20-39% inhibition). Addtionally, a small number of isolates are showing insensitivity to azoxystrobin and trifloxystrobin in several states. In summary, the 2007 survey revealed that, with the exception of benzimidazole, our fungicide chemistries remain effective for Cercospora leaf spot suppression and that fungicide resistance management must be practiced by growers to maintain long-term efficacy of our fungicide chemistries.

Materials and Methods

Cercospora leaf spot samples were collected from commercial sugar beet fields during the late growing season by the Western Sugar cooperative personnel and one sample collection was made in Wyoming by UW personnel. The 2007 survey consisted of leaf samples collected from 54 fields throughout the High Plains growing region: 8 fields from Colorado, 10 fields from Montana, 32 fields from Nebraska, and 4 fields from Wyoming. Leaf samples were air-dried and stored for approximately two months prior to recovery attempts. Up to three recovery attempts were made for each sample so that each field was represented by at least one fungal isolate, with up to 12 isolates was tested from a field. Cercospora isolates (239 isolates) were successfully recovered from 52 of the 54 fields; 8 fields from CO, 10 fields from MT, 30 from NE, and 4 fields from WY.

Fungicide sensitivity tests:

The media for testing the strobilurin fungicides azoxystrobin (Quadris®), trifloxystrobin (Gem®) and pyraclostrobin (Headline®) was made by amending glycerol medium and all other fungicides were added to potato dextrose agar (PDA). Diethofencarb, a fungicide with activity against certain benzimidazole-resistant fungi, also was tested. Media was autoclaved and cooled to approximately 55°C. Stock suspensions of 500 ppm triphenyltin hydroxide (Super Tin®, Agritin®), tetraconazole (Eminent®), propiconazole (Tilt®), azoxystrobin (Quadris®), trifloxystrobin (Gem®) and pyraclostrobin (Headline®) were prepared in sterile distilled water. Benzimidazole (used technical grade) and diethofencarb were both added to 5 ml of acetone prior to adding to the media. Stock suspensions were added to achieve concentrations in the media listed below; 13.5 mL of cool amended medium was dispensed into each Petri dish with the aid of an automatic dispensing unit. The poured plates were allowed to dry in the hood for at least 24 hr prior to use. The concentrations of amended media prepared were benzimidazole 5 ppm, triphenyltin hydroxide 1 ppm, tetraconazole 1 ppm, propiconazole 1 ppm, azoxystrobin 1 ppm, trifloxystrobin 1 ppm, pyraclostrobin 1 ppm, and diethofencarb 5 ppm.

Each isolate recovered from infected leaves was cultured onto a SBLEA (sugar beet leaf extract) source plate, incubated for 12 to 14 days at 23°C with a 12 hr photoperiod and the colony was allowed to desiccate prior to use for plate inoculations. Conidial suspensions from each isolate were prepared by scraping a small section of colony mycelium and adding it to small centrifuge tube containing 1 mL of sterile distilled water and then agitating with a vortex for 10 seconds. The conidial suspension was collected with an Eppendorf Repeater Plus® pipettor fitted with a sterile 0.1 mL pipette tip. For each isolate, non-amended and amended PDA and glycerol plates were inoculated with three evenly spaced 1.0 µL aliquots of the conidia suspension. Therefore, for each isolate tested there were eight amended plates plus glycerol and PDA non-amended control plates. All ten plates for a given isolate were sleeved together for incubation, two isolate series per sleeve. Known *Cercospora beticola* strains sensitive and insensitive to benzimidazole were included as controls. Inoculated plates were incubated at 23°C with a 12 hr photoperiod.

Colony diameters for each inoculation site were measured after 7 days growth with the aid of a digital caliper and the mean value for the three inoculation sites was computed for each isolate on each medium. The percentage of inhibition of radial growth for each test isolate grown on fungicide-amended media was compared to its growth on non-amended media. Because the diameter of the initial inoculum drop was approximately 3 mm (± 0.1 mm, 95% CI), 3 mm was subtracted from the mean colony diameter for each isolate before calculating growth inhibition. The percent inhibition for each isolate was then calculated with the following equation, [(non-amended control – amended)/non-amended control X 100]. Although isolates that had colony growth greater than 3 mm after 7 days had measurable “insensitivity” to the fungicide present in the amended medium, only isolates that exhibited 20% or less inhibition (80% or more growth) were considered insensitive.

Results and Discussion

A total of 239 isolates were recovered in 2007 from 52 sugar beet fields with symptoms of Cercospora leaf spot. For two of the fields we failed to recover *C. beticola* due to lack of sufficient lesions or the presence of other organisms. Each isolate represented a single separate foliar lesion. All isolates were tested for growth on the ten different media plates. Known benzimidazole sensitive and insensitive *C. beticola* isolates from prior surveys were tested and reacted consistently on the test media. Fifteen isolates were pulled from the strobilurin part of the survey due to no growth on the glycerol check plates. Therefore there were 224 isolates results summarized for azoxystrobin, trifloxystrobin and pyraclostrobin fungicides.

The *C. beticola* isolates that were inhibited 20 percent or less in the presence of fungicide were considered insensitive. In other words, these isolates grew at least 80 percent of their colony size in the presence of fungicide compared to their growth in the absence of fungicide. Isolate insensitivity data are summarized in Table 1. Insensitivity to triphenyltin hydroxide, tetraconazole, propiconazole, or pyraclostrobin was not detected. A total of 81 isolates (34%) were found to be insensitive to benzimidazole at 5 ppm. Montana had the greatest percentage of insensitive isolates (39%) followed by Nebraska (35%), Wyoming (33%), and Colorado (28%). A small number of isolates were found to be insensitive to azoxystrobin and trifloxystrobin.

The number of fields in which at least one benzimidazole insensitive isolate was detected are shown in Table 2. Overall, 52% of the fields tested in the High Plains region had detectable benzimidazole insensitivity in 2007. For Colorado 38% of the fields (3/8) were benzimidazole resistant; 2 of these 8 fields had mixed populations of sensitive and insensitive isolates. In Nebraska, 53% (16/30) of the fields had benzimidazole resistance; 10 of these 30 fields had mixed populations. Montana had 60% (6/10) of the fields with an insensitive isolate detected; 4 of these 10 fields had mixed populations. Wyoming had 4 fields tested with 2 of the 4 fields being insensitive and of mixed populations. The small sample size must be considered when evaluating data trends.

The range of insensitivity of *C. beticola* isolates in the presence of 1 ppm azoxystrobin, trifloxystrobin and pyraclostrobin fungicides are shown in Table 3. For the first time, a small number of isolates were found to be insensitive to azoxystrobin and trifloxystrobin. These isolates will be tested further. In general, isolates had greater inhibition of growth in the presence with pyraclostrobin compared to azoxystrobin and trifloxystrobin, similar to field trials that revealed pyraclostrobin suppressed Cercospora leaf spot more effectively than did azoxystrobin. Additionally, compared to past surveys, percent inhibition levels have been slowly decreasing for azoxystrobin and trifloxystrobin indicating a possible shift in the *C. beticola* populations to decreased susceptibility these fungicides.

Isolate inhibition in the presence of 1 ppm tetraconazole and propiconazole fungicides are summarized in Table 4. Although there were no insensitive isolates found for either tetraconazole or propiconazole, there was a trend of decreasing inhibition compared to previous survey years.

Isolate inhibition in the presence of triphenyltin hydroxide at 1 ppm are summarized in Table 5. The majority of the isolates were inhibited 90-100% at 1 ppm.

Isolate inhibition in the presence of benzimidazole at 5 ppm are summarized in Table 6. Results from the survey in 2006 revealed the presence of a number of “intermediate reaction” isolates that had exhibited inhibition levels between 21 and 74 percent. For the 2007 survey results this was not the case, with only 2 isolates that had 20-39% inhibition levels. One difference in methods this year compared to past years, was the use of technical grade benzimidazole rather than formulated benzimidazole (Benlate). Results for diethofencarb revealed that all isolates insensitive to benzimidazole were sensitive to diethofencarb, and isolates sensitive to benzimidazole were not affected by diethofencarb (negative cross resistance; data not shown).

Trends in survey results over the years for benzimidazole at 5 ppm are shown in Table 7. Based on total fields from the High Plains region, benzimidazole insensitivity increased from 26 percent in 1998 to a high of 80% in 2003, followed by a three year decline to 45% in 2005, 62% in 2006, and 52% in 2007. Results reveal the consistent trend that benzimidazole insensitivity is still widespread in High Plains sugar beet fields. Although the field fungicide-use data is incomplete, no fields sampled in 2007 indicated the use of benzimidazole for the 2007 field season. Additionally, 63 % of the fields considered to be insensitive to benzimidazole also had at least one sensitive isolate recovered from the same field (up from 46% in 2006 and 32% in 2005). This increase of mixed populations indicates a possible shift in *Cercospora beticola* populations.

Tests with diethofencarb reveal that all isolates insensitive or with an intermediate insensitive reaction to benzimidazole were sensitive to diethofencarb (negative cross resistance), suggesting diethofencarb plus benzimidazole use as a potential tank mix to suppress the spectrum of isolates present in the field. This approach had limited success in other production regions because tank mixes resulted in isolates insensitive to both diethofencarb and benzimidazole. More importantly, the consistent correlation of benzimidazole insensitivity to diethofencarb sensitivity suggests the presence of a single mutation that conferred benzimidazole insensitivity to all isolates recovered during 2004-2007 surveys. In summary, the 2007 survey reveals that our fungicide chemistries, except for benzimidazoles, remain effective and that fungicide resistance management must be practiced by growers to preserve the useful life of our fungicide chemistries.

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2007 Legume PIPE - Legume Disease Sentinel Plot Monitoring in Wyoming

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Introduction

The USDA Pest Information Platform for Extension and Education (PIPE) is a web-based resource http://www.sbrusa.net/cgi-bin/sbr/public.cgi designed to provide producers and researchers with the most recent information pertaining to soybean rust and soybean aphid development in North Americahttp://www.sbrusa.net/cgi-bin/sbr/public.cgi. In addition to the most recent observational information on these pests, the site provides management recommendations, scouting information and tools for growers to document good farming practices. Producers can utilize this information to implement timely management practices if a pest outbreak is nearby or in their production area.

To provide timely pest information, sentinel plots planted to soybeans and other various legume were established in participating bean growing states. PIPE survey participants monitor the sentinel plots periodically and upload pest information onto the PIPE website. Priority pests of legume crops monitored by PIPE were organized into four groups. Group 1 was comprised of diseases that cause small lesions which included soybean rust (national priority) and common rust. Group 2 were the diseases that cause small to large foliar and/or pod lesions or spots. Regional disease priorities in this group are determined by the regional specialists and for Wyoming this was white mold (*Sclerotinia sclerotiorum*). Group 3 included legume viruses. For Wyoming, bean common mosaic virus (BCMV), alfalfa mosaic virus (AMV) and beet curly top virus (BCTV) were specifically targeted for detection in the monitoring program. Group 4 included insect pests with soybean aphid being the national priority.

Phakopsora pachyrhizi and *P. meibomiae* are two fungal species that are the causative agents of soybean rust. Of the two, *P. pachyrhizi* is particularly aggressive and can infect more than 30 legume species, including dry bean, with reported yield losses of 10-80%. First detected in the United States in November 2004, the disease is now found in all the gulf states and also Georgia, North and South Carolina, Missouri, Arkansas, Oklahoma, Kansas, Nebraska, Iowa, Indiana, Illinois, Kentucky, Tennessee, Texas, and Virginia. *P. pachyrhizi* was formerly categorized as a select agent according to the Agricultural Bioterrorism Protection Act of 2002, but has been delisted following its appearance in the U.S. Soybean rust can be managed with available fungicides, however since it is a relatively new disease to the western hemisphere, resistant varieties have not yet been developed for U.S. production areas.

Soybean aphid (*Aphis glycines*) is a small, yellow aphid with distinct black cornicles ("tailpipes") on the tip of the abdomen. This aphid is a native of China and Japan and co-evolved with soybean. The soybean aphid can be found on stem apices and young leaves of growing plants, and on the underside of leaves of mature plants. Unlike other aphids that may be found on soybean, the soybean aphid forms colonies on soybean. Heavy feeding will reduce yields and the soybean aphid is capable of transmitting a number of viruses that naturally infect soybean.

Efforts in Wyoming sentinel plots concentrated on detection of soybean rust and soybean aphid in soybean. Also, the presence of soybean rust, several important legume viruses, white mold and bacterial bean blights was monitored for detection in both dry bean and soybean. Chickpea was included as a potential alternate host for several of these pests. Training also was provided to bean inspectors pertaining to disease detection, including soybean rust, common rust and bacterial bean diseases. Information from sentinel and monitoring plots was uploaded into the national data base along with local and regional recommendations for disease and pest management in the High Plains production area.

Monitoring and Sampling Methods

A total of seven legume sentinel plots were established in Wyoming in 2007 to detect and quantify priority diseases and insect pests of legumes on a regional basis. Five plots were established at the University of Wyoming's SAREC facility located near Lingle, WY. These SAREC plots included a soybean, chickpea, and three dry bean plots. Additionally, there were two dry bean plots located off-station, both located in Goshen Co., WY. Table 1 indicates cultural information and sampling times for each sentinel plot.

Additionally, training also was provided to bean inspectors pertaining to disease detection, including soybean rust, common rust and bacterial bean diseases. Inspection and surveillance of over 100 dry bean fields was conducted in northern and southeastern Wyoming.

Soybean rust sampling protocol: Sentinel plots were monitored approximately every two weeks, starting with the early reproductive stage and terminating with early pod maturity. Using a zig-zag pattern, 20 sites were located within the plot boundaries. At each site, the uppermost fully-expanded trifoliate leaf from each of five consecutive plants was collected. Additionally, group 2 diseases were noted if detected during this sampling period. The 100 leaves collected from each plot were bulked and returned to the laboratory for soybean rust evaluation. Leaves were placed in a humidity chamber. After approximately 24- to 48-hrs, the leaves were individually scrutinized for the presence of rust pustules and other disease symptomatology. These leaves also were individually evaluated for the presence of soybean aphid.

Secondary legume disease sampling protocol: Sentinel plots were sampled for several additional regionally important diseases during the late vegetative stage. Using the same plants sampled soybean rust, any disease was noted along with incidence and severity. White mold was the PIPE emphasis for 2007.

Legume virus sampling protocol: Plants were sampled from sentinel plots for virus testing at the late vegetative and early to mid pod growth stage. At these times, five leaves were sampled at nine sites, using the same sampling procedure as above (45 leaves total). Each set of five leaves was held separately in nine labeled ziplock bags and returned to the laboratory for virus assay. The viruses BCMV and AMV were tested in-house using ELISA test kits and protocols provided by AGDIA. For BCTV virus, test cards were spotted with sap from the 45 leaves and the cards sent to AGDIA for processing.

Soybean aphid sampling protocol: Using the same leaves as those collected for the virus assay, each leaf was inspected for soybean aphid and soybean rust. These leaves were not pre-icubated at high humidity. Aphids detected on leaves were removed and preserved in alcohol for enumeration and taxonomic confirmation.

Additional insect pest sampling protocol: Sentinel plots were sampled for additional insect pests during the mid to late pod-fill stages. Nine sites were within each plot boundary were sampled in a zig-zag pattern. At each site a beater board (1.5 ft^2) was placed between rows and approximately five plants on each side (10 plants total) were shaken over the board and relevant insects counted.

Results

Soybean rust and soybean aphid were not detected in Wyoming sentinel and monitoring plots in 2007. Additionally, soybean rust was not detected in approximately 120 fields surveyed outside of the IPM-PIPE program. However, soybean rust however was detected at other locations in the High Plains outside of Wyoming. White mold, the regional group 2 priority disease, was found in one sentinel plot (WYSARECST03_Pinto) on 14 August, but incidence was only 3% of plants affected. Additional results are summarized in Table 2.

Virus testing results for the IPM-PIPE plots are summarized in Table 3. Bean common mosaic virus was not detected, however, alfalfa mosaic virus was sporadically detected in the Anasazi and Mayacoba plots. These tests were not clearly definitive, although some leaf samples from these plots occasionally exhibited virus-like symptoms. The IPM-PIPE test for beet curly top virus indicated presence of this virus in IPM-PIPE plots as indicated in Table 3. However, field observations were not consistent with test results. Two fields not included as IPM-PIPE plots experienced heavy infestations of bean common mosaic virus in northern Wyoming. Leaf samples from these fields were tested via standard ELISA test kits from AGDIA: these samples proved to be positive for a high incidence of bean common mosaic virus and all were negative for the presence of alfalfa mosaic virus.

Table 1. PIPE sentinel plot information (G.D. Franc, W.L. Stump and J.T. Cecil, U of WY; 2007).

IPM-PIPE Plot Designation	Legume Type	Plot Dimension	Planting Date	Sampling Date & Growth Stage	Sampling Scope
WYLingleST01_Northern	Dry bean, northern	50' x 50'	5/12	7/26, R1	Soybean rust sample, secondary disease survey, leaf sampling for virus test and soybean aphid.
				8/2, R2	Soybean rust and soybean aphid sample
				8/10, R3	Insect pest sampling
				8/14, R4	Soybean rust and soybean aphid sample
				8/23, R7	Soybean rust sample, secondary disease survey, leaf sampling for virus test and soybean aphid.
WYTorringtonST01_Pinto	Dry bean, pinto	50' x 50'	5/17	7/26, R2	Soybean rust sample, secondary disease survey, leaf sampling for virus test and soybean aphid.
				8/2, R2	Soybean rust and soybean aphid sample
				8/14, R4	Soybean rust and aphid sample, and insect pest sampling
				8/23, R7	Soybean rust and soybean aphid sample, leaf sampling for virus test and soybean aphid.
WYSARECST01_Soybean	Soybean	50' x 50'	5/31	7/17, R1	Secondary disease survey, leaf sampling for virus test and soybean aphid.
				7/24, R1	Soybean rust and soybean aphid sample
				7/31, R2	Soybean rust and soybean aphid sample
				8/14, R4	Soybean rust and aphid sample, and insect pest sampling
				8/21, R4	Soybean rust and soybean aphid sample, leaf sampling for virus test and soybean aphid.

IPM-PIPE Plot Designation	Legume Type	Plot Dimension	Planting Date	Sampling Date & Growth Stage	Sampling Scope
				8/28, R6	Soybean rust and soybean aphid sample
WYSARECST02_Chickpea	Chickpea	37.5' x 100'	5/31	7/19, R3	Secondary disease survey, leaf sampling for virus test and soybean aphid.
				7/24, R3	Soybean rust and soybean aphid sample
				7/31, R5	Soybean rust and soybean aphid sample
				8/7, R7	Leaf sampling for virus test and soybean aphid, and insect pest sampling
WYSARECST03_Pinto	Dry bean, pinto	50' x 50'	5/30	7/17, R1	Secondary disease survey, leaf sampling for virus test and soybean aphid.
				7/24, R1	Soybean rust and soybean aphid sample
				7/31, R3	Soybean rust and soybean aphid sample
				8/14, R7	Soybean rust sample, secondary disease survey
				8/16, R7	Leaf sampling for virus test and soybean aphid.
				8/21, R8	Soybean rust and soybean aphid sample
WYSARECST04_Anasazi	Dry bean, Anasazi	40' x 100'	6/26	8/7, R1	Leaf sampling for virus test and soybean aphid, and insect pest sampling
				8/23, R3	Soybean rust and soybean aphid sample
				8/28, R3	Soybean rust and soybean aphid sample, leaf sampling for virus test and soybean aphid and insect pest sampling

IPM-PIPE Plot Designation	Legume Type	Plot Dimension	Planting Date	Sampling Date & Growth Stage	Sampling Scope
WYSARECST05_Mayacoba	Dry bean, Mayacoba	40' x 100'	6/26	8/7, R1	Leaf sampling for virus test and soybean aphid, and insect pest sampling
				8/23, R3	Soybean rust and soybean aphid sample
				8/28, R4	Soybean rust and soybean aphid sample, leaf sampling for virus test and soybean aphid and insect pest sampling

Table 2. IPM-PIPE sentinel plot priority pest results for 2007 (G.D. Franc, W.L. Stump and J.T. Cecil, U of WY; 2007).

IPM-PIPE Plot Designation	**Survey Date**	**Disease and Incidence**	**Insect and Incidence**
WYLingleST01_Northern	8/10		-Thrips 7 / 90 plants
WYTorringtonST01_Pinto	8/14		-Mexican bean beetle 8 / 90 plants
WYSARECST01_Soybean	8/14		-Thrips 1 / 90 plants
WYSARECST02_Chickpea	8/7		-Thrips 8 / 90 plants
WYSARECST03_Pinto	7/24		-Mexican bean beetle 13 / 100 leaves
	8/14	-White mold 3 / 100 plants	-Mexican bean beetle 9 / 90 plants
	8/16		-Mexican bean beetle 9 / 45 leaves
WYSARECST04_Anasazi	8/7		-Thrips 1 / 90 plants -Flea beetle 7 / 90 plants
	8/28		-Thrips 1 / 45 leaves -Flea beetle 7 / 90 plants
WYSARECST05_Mayacoba	8/7		-Mexican bean beetle 2 / 90 plants -Thrips 1 / 90 plants -Flea beetle 4 / 90 plants
	8/28		-Mexican bean beetle 1 / 45 leaves -Mexican bean beetle 4 / 90 plants -Flea beetle 7 / 90 plants

Table 3. IPM-PIPE sentinel plot virus assay results for 2007 (G.D. Franc, W.L. Stump and J.T. Cecil, U of WY; 2007).

PIPE Sentinel Plot	**Sampling Date**	**Card #**	**Virus Incidence Number of Positive Virus Reactions / Number of Leaves Tested**		
			BCMV[1]	AMV[1]	BCTV[1]
WYLingleST01_Northern	7/26/07	1G	0/45	0/45	18/45
WYLingleST01_Northern	8/23/07	2G	0/45	0/45	2/45
WYTorringtonST01_Pinto	7/26/07	13K	0/45	0/11	2/11
WYTorringtonST01_Pinto	8/23/07	14K	0/45	0/45	0/11
WYSARECST01_Soybean	7/17/07	3S	0/45	0/45	0/45
WYSARECST01_Soybean	8/21/07	4S	0/45	0/45	0/45
WYSARECST02_Chickpea	7/19/07	5C	0/45	0/45	1/45
WYSARECST02_Chickpea	8/7/07	6C	0/45	0/45	3/45
WYSARECST03_Pinto	7/17/07	7P	0/45	0/45	0/45
WYSARECST03_Pinto	8/16/07	8P	0/45	0/45	2/45
WYSARECST04_Anasazi	8/7/07	9A	0/45	0/45	0/45
WYSARECST04_Anasazi	8/28/07	10A	0/45	1/45	2/45
WYSARECST05_Mayacoba	8/7/07	11M	0/45	0/45	10/45
WYSARECST05_Mayacoba	8/28/07	12M	0/45	1/45	9/45

[1] Viruses tested; BCMV = Bean common mosaic virus, AMV = alfalfa mosaic virus and BCTV = beet curly top virus. All testing followed the established IPM-PIPE protocol.

University of Wyoming Research and Extension
Plant Pathology Field Crops Disease Survey

Survey Title: Detection of Bacterial Wilt of Bean in the Western Region-Wyoming 2007

Disease and Target Pest: Bacterial Wilt (Curtobacterium flaccumfaciens pv. flaccumfaciens) of Dry Edible or Common Bean (Phaseolus vulgaris)

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Background and Justification: Bacterial Wilt is caused by the bacterium Curtobacterium flaccumfaciens pv. flaccumfaciens, and is a disease that affects dry edible or common bean (Phaseolus vulgaris). In recent years, this disease has threatened dry bean production in western states, including Colorado, Nebraska, and Wyoming and is of concern to other major bean-producing western states. During 2004, infested fields in Nebraska were estimated to yield two- thirds less than expected of a normal crop, and incidence of discolored, infected seeds approached 10% in some fields, significantly reducing quality and ultimately, profitability. A 10% loss in productivity in a bean producing state like Wyoming could cost growers an estimated 1.5 million dollars, and possibly more if exports are threatened. An additional concern is that in Wyoming, 10,319 acres, 7,938 acres, and 6,763 acres of bean were certified in 2005, 2006 and 2007, respectively. Bacterial wilt is a zero tolerance disease and any level of infestation is unacceptable for certification of the seed crop. The reduction in revenue that results when a crop is not eligible for certification, and is sold as commercial beans rather than as seed, is approximately $70 per acre. If 10% yield loss from the disease is added to the loss in additional revenue for seed production, the cost would be $130 per acre. Loss of certification would greatly affect production opportunities in a region where cropping options are very limited.

Bacterial wilt is a seed-borne disease and the bacterium appears incapable of prolonged soil survival. However, the re-emergence of this disease suggests that our current knowledge is incomplete pertaining to bacterial wilt epidemiology and pathogen persistence. Economic losses (bean yield and/or loss of certification) in the field are believed to result primarily from inadvertent planting of infested seed. Although seed-certification programs have a zero tolerance, low disease incidence, latency, and non-diagnostic symptomatology, all serve to make detection difficult. Focused training to improve disease detection during surveys also will enable early elimination of the pathogen from the seed supply chain. Surveys to detect infested seed fields and commercial fields will enable tracing infestations back to the seed source. Thus, survey results will provide information pertaining to pathogen distribution in the prior year, as well as aid in identification of cultural-specific activities important to disease epidemiology and pathogen persistence.

Detection of the disease in fields destined for seed production will prevent inadvertent distribution of the pathogen via seed distribution channels. For example, approximately 90% of the Wyoming seed crop is planted in the upper mid-west (North Dakota, Minnesota and Michigan) with exports to Canada. Exports of seed from the state rely upon quality, disease free seed, or there will be no incentive to pay for additional cost to transport seed from Wyoming. Loss of that incentive will severely impact the bean seed industry in Wyoming, which is 20 to 25 percent of the total bean acreage in the state in any given year.

Because the factors controlling the re-emergence of bacterial wilt are unknown at this time, it is critical that the exact distribution and incidence of the pathogen be determined.

Objective: The purpose of this cooperative multi-state project is to conduct a methodical state-wide survey of dry bean production regions in North Central and Southeastern Wyoming for distribution of bacterial wilt in dry bean. Detection of this seed-borne disease will serve to limit pathogen spread, establishment, and subsequent disease impact in Wyoming and other areas to which seed beans are distributed. Nebraska and Colorado will conduct a similar survey, subject to available resources.

Data obtained from the survey in Wyoming will determine the extent of the infestation throughout the State. Sporadic detections of bacterial wilt occur in the western region, and the extent of the problem is not known. Survey results will enable development of realistic and appropriate disease management plans. This disease threatens both commercial and certified seed production regions

Approach: University of Wyoming inspectors will be trained to conduct visual surveys for bacterial wilt symptomatic plants in current (new crop seeded) fields. Surveys will be conducted in the north central Wyoming (Big Horn basin) and south eastern Wyoming during the growing season. Most fields selected will be visited twice. The presence of symptomatic plants will be noted and tagged by GPS, enabling maps to be created that represent the observed disease distribution. Access to a high percentage of acreage is typically available through the seed certification program (8,140 acres in 2005) and the quality assurance programs (2,179 acres in 2005) already in place. Training on disease recognition, sample collection, and GPS technology will be provided to inspectors.

Symptomatic plants (inter-veinal necrotic lesions surrounded by yellow borders on leaves, possible water-soaking of leaves or pods, wilted and dead plants) will be transported to the laboratory at the University of Wyoming for initial analyses utilizing standard laboratory protocols. These will include streaking of surface-sterilized symptomatic tissue and sap from such tissue onto bacteriological media, followed by incubation, and observation for characteristic colony type. Suspicious colonies will be purified by subculturing and evaluated for pathogenicity by bioassay on susceptible seedlings (e.g., pinto Othello). Bacterial strains will be evaluated via PCR, Biolog, and cryogenically preserved for future research and as a reference for comparison of strains from different bean producing regions. Bacterial wilt type-cultures will also be sent to cooperating diagnostic labs.

Geographic Scope of the Project: In recent years, this disease has threatened dry bean production in western states, including Colorado, Nebraska, and Wyoming and is of concern to other major bean-producing western states.

Data obtained from the survey in Wyoming will determine the extent of the infestation throughout the State. Sporadic detections of bacterial wilt occur in the western region, and the extent of the problem is not known. Survey results will enable development of realistic and appropriate disease management plans and cooperative extension programming. This disease threatens both commercial and certified seed production regions.

Accomplishments and Results for 2007: A dry bean disease nursery was established to train personnel involved in the field inspections. Beans inoculated with halo blight (Pseudomonas syringae pv. phaseolicola), common blight (Xanthomonas campestris pv. phaseoli), and bean common mosaic virus (BCMV) were planted in field plots located at the Sheridan Community College campus on 18 May, 2007. Training on disease detection was offered by the University of Wyoming Plant Pathology Specialist (GDF) at the Sheridan Community College on 17 July, 2007. Training consisted of a powerpoint slide presentation that covered disease life cycles, inspection techniques, and other pertinent issues related to visual disease detection. Distinction among the symptomatology pertaining to the various bacterial bean blights, including bacterial wilt, were provided. Training then continued in the field plots where inoculated beans had been planted in alternating rows with "healthy" beans. Specific techniques and methods were demonstrated for detecting and identifying various diseases in the field. Seven inspectors for the Wyoming Seed Certification Service and Jack Cecil participated in the 2007 training.

A total of 125 fields representing approximately 4,120 acres were surveyed (Tables 1 and 2). North central Wyoming had 119 field sites and south eastern Wyoming had six field sites. The number of survey visits at each field site ranged from one to seven, with a total number of 267 field visits completed during the survey with an average of 2.14 visits per field. An estimated 6.2 million plants were visually inspected during the first inspection date for all 125 field sites combined. A map of field sites is summarized in Figure 1.

All sites were negative for detection of bacterial wilt in Wyoming. Several unusual bacterial strains were recovered from plants with symptoms not consistent with bacterial wilt. Additional work is being done to characterize these isolates.

Preliminary work was conducted to develop diagnostic probes for Curtobacterium flaccumfaciens pv. flaccumfaciens. Development of suitable probes will aid diagnostic efforts associated with bacterial wilt and may supplement bioassays.

Acknowledgement: The field portion of the training was planted with assistance from Dan Smith, who prepared and managed the Sheridan plot area during the growing season.

Table 1. 2007 field survey result for the detection of bacterial wilt (Curtobacterium flaccumfaciens pv. flaccumfaciens) of dry edible or common bean (Phaseolus vulgaris) in Wyoming (G.D. Franc, et al., U. of Wyoming, Dept. of Plant Sciences, Laramie WY 82071).

Lab ID	Field ID	Bean Type	Acres	GPS Coordinates	WY County	Inspection Date 1*	Inspection Date 2*	BW Results
2007.034	W32- 045-2165C	Pinto	64.2	N 44° 29.471' W 108° 25.954'	Big Horn	8/8/2007	9/24/2007	negative
2007.035	W32- 375-2161C	Pinto	35.0	N 44° 45' 13.1" W 108° 40' 43.9"	Park	8/15/2007	9/6/2007	negative
2007.036	W32-003-2042C	Pinto	58.0	N 44° 37' 907" W 108° 58' 591"	Park	8/8/2007	9/14/2007	negative
2007.037	W32-003-2120C	Pinto	64.0	N 44° 38' 26.7" W 108° 58' 58.1"	Park	8/8/2007	9/4/2007	negative
2007.038	W32-005_2119E	Pinto	24.0	N 44° 44' 30.4" W 108° 57' 24.7"	Park	8/14/2007	9/16/2007	negative
2007.039	W32-005-2034R	Pinto	42.0	N 44° 44' 011" W 108° 55' 987"	Park	8/9/2007	9/12/2007	negative
2007.040	W32-005-2118R	Pinto	24.0	N 44° 43' 49.2" W 108° 56' 28.3"	Park	8/10/2007	9/11/2007	negative
2007.041	W32-009-2127E	Pinto	40.0	N 44° 30' 20.2" W 108° 25' 20.4"	Big Horn	7/16/2007	9/7/2017	negative
2007.042	W32-009-2128C	Pinto	146.1	N 44° 30' 21.6" W 108° 22' 52.9"	Big Horn	7/16/2007	9/6/2007	negative
2007.043	W32-009-2129C	Pinto	102.0	N 44° 28' 53.2" W 108° 25' 54.6'	Big Horn	8/13/2007	9/21/2007	negative
2007.044	W32-009-2130E	Pinto	12.6	N 44° 29' 55.0" W 108° 24' 43.7"	Big Horn	7/19/2007	9/7/2007	negative
2007.045	W32-009-2131QA	Pinto	78.7	N 44° 30' 47.3" W 108° 21' 03.9"	Big Horn	8/9/2007	9/19/2007	negative
2007.046	W32-009-2132QA	Pinto	80.0	N 44° 30' 21.7" W 108° 16' 10.6"	Big Horn	7/19/2007	10/1/2007	negative
2007.047	W32-009-2133QA	Pinto	60.2	N 44° 29' 48.1" W 108° 16' 10.3"	Big Horn	8/9/2007	10/11/2007	negative
2007.048	W32-009-2134QA	Pinto	50.9	N 44° 29' 56.0" W 108° 16' 10.6"	Big Horn	8/9/2007	10/11/2007	negative
2007.049	W32-009-2135C	Navy	63.8	N 44° 29' 55.1" W 108° 24' 49.6"	Big Horn	7/16/2007	9/12/2007	negative
2007.050	W32-009-2136R	Pinto	25.0	N 44° 30' 09.6" W 108° 24' 43.6"	Big Horn	7/16/2007	9/19/2007	negative
2007.051	W32-009-2137C	Pinto	10.0	N 44° 30' 19.7" W 108° 24' 43.7"	Big Horn	7/16/2007	9/19/2007	negative
2007.052	W32-009-2138C	Pinto	44.1	N 44 30' 3.9" W 108 23' 29.3"	Big Horn	7/16/2007	10/1/2007	negative
2007.053	W32-009-2139C	Pinto	30.0	N 44° 30' 27.0" W 180° 23' 29.2"	Big Horn	7/16/2007	10/1/2007	negative
2007.054	W32-009-2140C	Pinto	57.4	N 44° 30' 50.2" W 108° 22' 53.6"	Big Horn	7/16/2007	9/6/2007	negative
2007.055	W32-009-2141C	Pinto	73.0	N 44° 31' 00.8" W 108° 22' 53.8"	Big Horn	7/16/2007	9/6/2007	negative
2007.056	W32-009-2142QA	Pinto	36.3	N 44° 29' 27.6" W 108° 24' 06.2"	Big Horn	8/13/2007	10/1/2007	negative
2007.057	W32-014-2010QA	Navy	20.0	N 44° 26.315" W 108° 26.844"	Big Horn	8/1/2007	9/17/2007	negative
2007.058	W32-014-2012C	Small Red	50.0	N 44° 23.319" W 108° 27.193"	Big Horn	8/6/2007	9/28/2007	negative
2007.059	W32-023-2056C	Small Red	40.0	N 44° 29' 113" W 108° 25' 937"	Big Horn	8/7/2007	9/14/2007	negative
2007.060	W32-023-2057QA	Navy	50.0	N 44° 23' 857" W 108° 27' 152"	Big Horn	8/7/2007	9/14/2007	negative
2007.061	W32-033-2037C	Pinto	19.0	N 44° 48' 746" W 108° 28' 578"	Big Horn	8/15/2007	9/19/2007	negative
2007.062	W32-033-2038R	Pinto	45.0	N 44° 44' 047" W 108° 37' 137"	Park	8/15/2007	9/19/2007	negative

Lab ID	Field ID	Bean Type	Acres	GPS Coordinates	WY County	Inspection Date 1*	Inspection Date 2*	BW Results
2007.063	W32-033-2039QA	Navy	27.0	N 44° 48' 850" W 108° 28' 608"	Big Horn	8/15/2007	9/28/2007	negative
2007.064	W32-033-2104C	Navy	55.0	N 44° 45' 23.0" W 108° 33' 06.7"	Big Horn	8/13/2007	9/28/2007	negative
2007.065	W32-033-2105C	Navy	45.0	N 44° 45' 09.2" W 108° 33' 24.8"	Big Horn	8/13/2007	9/24/2007	negative
2007.066	W32-037-2176E	Pinto	23.0	N 44° 25.674' W 108° 22.974'	Big Horn	8/2/2007	9/27/2007	negative
2007.067	W32-037-2176E	Pinto	13.0	N 44° 25.278' W 108° 22.237'	Big Horn	8/2/2007	10/3/2007	negative
2007.068	W32-037-2178E	Pinto	5.0	N 44° 25.278' W 108° 22.237'	Big Horn	8/2/2007	10/3/2007	negative
2007.069	W32-044-2156QA	Pinto	68.0	N 44° 21' 43.9' W 108° 39' 54.0"	Park	8/8/2007	9/14/2007	negative
2007.070	W32-045-2165C	Pinto	68.1	N 44° 29.874' W 108° 25.630'	Big Horn	8/8/2007	9/24/2007	negative
2007.071	W32-082-2013C	Pinto	20.2	N 44° 43' 486" W 108° 48' 955"	Park	7/18/2007	9/25/2007	negative
2007.072	W32-082-2014C	Pinto	6.7	N 44° 43' 276" W 108° 49' 243"	Park	7/18/2007	9/25/2007	negative
2007.073	W32-082-2086C	Pinto	39.2	N 44° 43' 02.9" W 108° 48' 56.7"	Park	7/27/2007	9/20/2007	negative
2007.074	W32-082-2087C	Pinto	20.6	N 44° 43' 02.8" W 108° 49' 32.3"	Park	7/18/2007	9/13/2007	negative
2007.075	W32-082-2088C	Pinto	20.0	N 44° 43' 23.9" W 108° 50' 27.1"	Park	7/18/2007	9/20/2007	negative
2007.076	W32-082-2089C	Pinto	38.7	N 44° 43' 03.01" W 108° 48' 56.4"	Park	7/18/2007	9/13/2007	negative
2007.077	W32-082-2090E	Pinto	24.3	N 44° 44' 22.1" W 108° 49' 48.2"	Park	7/18/2007	9/20/2007	negative
2007.078	W32-082-2091QA	Pinto	17.2	N 44° 43' 28.9" W 108° 49' 29.8"	Park	7/24/2007	9/25/2007	negative
2007.079	W32-082-2092QA	Pinto	22.1	N 44° 43' 04.1" W 108° 49' 33.0"	Park	7/24/2007	9/28/2007	negative
2007.080	W32-082-2093QA	Mayacoba	10.6	N 44° 43' 28.9" W 108° 40' 30.1"	Park	7/24/2007	8/27/2007	negative
2007.081	W32-082-2163C	Pinto	31.5	N 44° 43.052' W 108° 48.524'	Park	7/18/2007	9/14/2007	negative
2007.082	W32-082-2163C	Pinto	40.2	N 44° 43.650' W 108° 50.445'	Park	7/18/2007	9/10/2007	negative
2007.083	W32-084-2094QA	Pinto	13.3	N 44° 46' 19.0" W 108° 40' 43.4"	Park	7/31/2007	9/7/2007	negative
2007.084	W32-084-2095QA	Pinto	35.0	N 44° 46' 05.3" W 108° 41' 02.0"	Park	7/30/2007	9/16/2007	negative
2007.085	W32-084-2096QA	Pinto	13.8	N 44° 46' 16.2" W 108° 40' 43.8"	Park	7/31/2007	9/7/2007	negative
2007.086	W32-085-2083C	Pinto	32.0	N 44° 43' 55.2" W 108° 46' 11.4"	Park	8/1/2007	8/29/2007	negative
2007.087	W32-085-2084C	Pinto	12.0	N 44° 44' 52.3" W 108° 44' 04.5"	Park	8/1/2007	not done	negative
2007.088	W32-085-2085C	Pinto	31.0	N 44° 44' 34.3" W 108° 44' 58.5"	Park	8/1/2007	not done	negative
2007.089	W32-088-2066C	Pinto	27.0	N 44° 43' 448" W 108° 57' 396"	Park	8/14/2007	9/2/2007	negative
2007.090	W32-088-2067C	Pinto	16.0	N 44° 43' 110" W 108° 56' 512"	Park	8/14/2007	9/2/2007	negative
2007.091	W32-088-2122C	Pinto	16.0	N 44° 43' 31.4" W 108° 58' 37.1"	Park	8/14/2007	9/6/2007	negative
2007.092	W32-088-2123C	Pinto	27.0	N 44° 43' 39.5" W 108° 59' 36.2"	Park	8/14/2007	9/6/2007	negative
2007.093	W32-088-2124C	Pinto	10.0	N 44° 42' 59.1" W 108° 57' 38.7"	Park	8/14/2007	9/2/2007	negative
2007.094	W32-131-2076QA	Navy	34.0	N 44° 39' 879" W 108° 56' 524"	Park	8/7/2007	10/4/2007	negative
2007.095	W32-131-2077C	Navy	46.0	N 44° 39' 955" W 108° 36' 406"	Park	8/7/2007	10/2/2007	negative
2007.096	W32-228-2058C	Pinto	11.0	N 44° 41' 767" W 108° 50' 733"	Park	8/13/2007	9/11/2007	negative
2007.097	W32-230-2115QA	Pinto	18.0	N 44° 42' 54.4" W 108° 48' 01.5"	Park	8/10/2007	9/10/2007	negative
2007.098	W32-230-2114QA	Pinto	24.0	N 44° 43' 02.6" W 108° 48' 00.6"	Park	8/10/2007	9/10/2007	negative

2007.099	W32-238-2097QA	Mayacoba	9.0	N 44° 44' 40.7" W 108° 44' 15.1"	Park	7/30/2007	10/3/2007	negative
2007.100	W32-238-2098QA	Mayacoba	9.0	N 44° 44' 40.8" W 108° 44' 22.0"	Park	8/8/2007	10/3/2007	negative
2007.101	W32-238-2099QA	Pinto	33.0	N 44° 44' 08.7" W 108° 46' 11.6"	Park	8/8/2007	9/16/2007	negative
2007.102	W32-238-2100QA	Pinto	28.0	N 44° 43' 12.7" W 108° 42' 51.3"	Park	8/8/2007	9/18/2007	negative
2007.103	W23-238-2101QA	Pinto	28.0	N 44 44' 06.5" W 108 45' 35.1"	Park	8/8/2007	9/10/2007	negative
2007.104	W32-238-2102C	Pinto	11.0	N 44° 43' 16.7" W 108° 42' 15.2"	Park	8/15/2007	9/10/2007	negative
2007.105	W32-238-2103R	Pinto	6.0	N 44° 43' 20.1" W 108° 42' 15.1	Park	8/15/2007	9/5/2007	negative
2007.106	W32-279-2113QA	Pinto	28.0	N 44° 43' 45.1" W 108° 46' 47.9"	Park	7/13/2007	9/25/2007	negative
2007.107	W32-281-2000C	Pinto	26.0	N 44° 44.393" W 109° 00.445"	Park	8/9/2007	9/14/2007	negative
2007.108	W32-281-2001C	Pinto	28.0	N 44° 43. 662" W 108° 58.378"	Park	8/9/2007	9/7/2007	negative
2007.109	W32-281-2002C	Pinto	30.0	N 44° 44.309" W 109° 01.696"	Park	8/10/2007	9/6/2007	negative
2007.110	W32-282-2147C	Pinto	45.1	N 44° 30' 20.2" W 108° 22' 53.5"	Big Horn	8/7/2007	9/27/2007	negative
2007.111	W32-282-2148C	Pinto	5.9	N 44° 30' 17.0" W 108° 30' 53.5"	Big Horn	8/2/2007	9/27/2007	negative
2007.112	W32-282-2149C	Pinto	11.9	N 44° 31' 00.3" W 108° 24' 27.8"	Big Horn	8/2/2007	9/28/2007	negative
2007.113	W32-282-2150C	Pinto	25.0	N 44° 30' 12.0" W 108° 23' 53.4"	Big Horn	8/8/2007	9/27/2007	negative
2007.114	W32-282-2151C	Pinto	4.1	N 44° 30' 20.2" W 108° 23' 39.5"	Big Horn	8/3/2007	9/27/2007	negative
2007.115	W32-282-2153QA	Pinto	4.1	N 44° 40' 21.1" W 108° 34' 55.4"	Big Horn	8/8/2007	10/25/2007	negative
2007.116	W32-282-2154C	Pinto	33.0	N 44° 40' 25.8" W 108° 34' 39.5"	Big Horn	8/8/2007	9/27/2007	negative
2007.117	W32-284-2005C	Pinto	39.0	N 44° 41.505" W 108° 49.861"	Park	7/31/2007	not done	negative
2007.118	W32-284-2006C	Pinto	28.0	N 44° 41.754" W 108° 50.473"	Park	7/31/2007	9/5/2007	negative
2007.119	W32-284-2007C	Pinto	26.0	N 44° 41.379" W 108° 51.920"	Park	7/24/2007	9/2/2007	negative
2007.120	W32-284-2008C	Pinto	51.0	N 44° 41.167" W 108° 50.294"	Park	7/31/2007	9/2/2007	negative
2007.121	W32-284-2009C	Pinto	25.0	N 44° 41.563" W 108° 50.482"	Park	7/31/2007	9/7/2007	negative
2007.122	W32-288-2046C	Pinto	37.0	N 43° 45' 842" W 108° 10' 542"	Hot Springs	8/3/2007	9/7/2007	negative
2007.123	W32-288-2075C	Pinto	35.0	N 43° 46' 05" W 108° 10' 00"	Hot Springs	8/3/2007	9/22/2007	negative
2007.124	W32-304-2187C	Pinto	15.0	N 44° 11' 37" W 107° 56' 33"	Big Horn	7/25/2007	9/24/2007	negative
2007.125	W32-335-2107C	Pinto	46.5	N 44° 45' 14.1" W 108° 47' 28.7"	Park	8/15/2007	9/12/2007	negative
2007.126	W32-335-2108C	Pinto	29.0	N 44° 44' 47.3" W 108° 47' 01.2"	Park	8/15/2007	9/12/2007	negative
2007.127	W32-335-2109C	Pinto	64.8	N 44° 43' 59.5" W 108° 49' 14.8"	Park	8/15/2007	9/6/2007	negative
2007.128	W32-335-2110C	Pinto	7.7	N 44° 44' 38.3" W 108° 46' 59.1"	Park	8/15/2007	9/12/2007	negative
2007.129	W32-375-2069C	Mayacoba	40.0	N 44° 45' 214" W 108° 40' 112"	Park	8/8/2007	9/11/2007	negative
2007.130	W32-375-2160C	Navy	28.0	N 44° 44' 21.5" W 108° 44' 46.6"	Park	8/13/2007	9/4/2007	negative
2007.131	W32-375-2162C	Pinto	30.0	N 44° 45' 13.6" W 108° 39' 46.7"	Park	8/13/2007	9/4/2007	negative
2007.132	W32-397-2169C	Pinto	38.0	N 44° 44.351' W 108° 49.853'	Park	8/14/2007	9/18/2007	negative
2007.133	W32-397-2169C	Pinto	38.0	N 44° 45.922' W 108° 45.285'	Park	8/14/2007	10/2/2007	negative

2007.134	W32-397-2169C	Pinto	12.0	N 44° 45.922' W 108° 45.285'	Park	8/14/2007	9/28/2007	negative
2007.135	W32-397-2169C	Pinto	33.0	N 44° 44.350' W 108° 49.238'	Park	8/17/2007	9/13/2007	negative
2007.136	W32-397-2170C	Pinto	38.0	N 44° 44.016' W 108° 48.021'	Park	8/13/2007	9/17/2007	negative
2007.137	W32-397-2170C	Pinto	28.0	N 44° 43.476' W 108° 48.639'	Park	8/13/2007	9/13/2007	negative
2007.138	W32-397-2170C	Pinto	37.0	N 44° 44.785' W 108° 48.024'	Park	8/13/2007	9/21/2007	negative
2007.139	W32-397-2170C	Pinto	12.0	N 44° 45.441' W 108° 48.421'	Park	8/13/2007	9/25/2007	negative
2007.140	W32-397-2170C	Pinto	12.0	N 44° 45.547' W 108° 48.023'	Park	8/13/2007	9/25/2007	negative
2007.141	W32-409-1997C	Pinto	40.0	N 44° 45' 257" W 108° 57' 967"	Park	8/9/2007	9/24/2007	negative
2007.142	W32-409-1999C	Pinto	22.0	N 44° 44. 779" W 108° 59'.859"	Park	8/9/2007	9/4/2007	negative
2007.143	W32-421-2061C	Black	25.0	N 44° 44' 886" W 108° 55' 944"	Park	8/10/2007	9/26/2007	negative
2007.144	W32-421-2062C	Black	25.0	N 44° 44' 417" W 108° 55' 954"	Park	8/15/2007	9/26/2007	negative
2007.145	W32-441-2052C	Navy	42.0	N 44° 24' 201" W 108° 19' 442"	Big Horn	8/6/2007	9/20/2007	negative
2007.146	W32-441-2053C	Pinto	72.0	N 44° 25' 731" W 108° 17' 189"	Big Horn	8/6/2007	9/4/2007	negative
2007.147	W32-447-2044C	Pinto	28.0	N 44° 43' 282" W 108° 44' 411"	Park	8/7/2007	9/11/2007	negative
2007.148	W32-447-2111C	Pinto	35.0	N 44° 43' 13.9" W 108° 44' 59.0"	Park	8/2/2007	9/7/2007	negative
2007.149	W32-447-2112C	Pinto	37.0	N 44° 43' 08.8" W 108° 44' 59.3"	Park	8/2/2007	9/7/2007	negative
2007.150	W32-450-2121C	Pinto	73.0	N 44° 43' 53.2" W 109° 02' 39.5"	Park	8/14/2007	8/29/2007	negative
2007.151	W32-468-2125C	Pinto	40.0	N 44° 56' 48.8" W 109° 05' 48.0"	Park	8/6/2007	9/10/2007	negative
2007.152	W32-468-2126C	Pinto	40.0	N 44° 56' 49.2" W 109° 05' 56.4"	Park	8/6/2007	9/2/2007	negative
2007.153	WYLingleST01_Northern	Northern	60.0	N 42.13301 W 104.35662	Goshen	7/26/2007	8/2/2007	negative
2007.154	WYTorringtonST01_Pinto	Pinto	40.0	N 41.97255 W 104.1191	Goshen	7/26/2007	8/2/2007	negative
2007.155	WYSARECST03_Pinto	Pinto	20.0	N 42.13121 W 104.39932	Goshen	7/17/2007	7/24/2007	negative
2007.156	WYSARECST04_Anasazi	Anasazi	<1	N 42.12903 W 104.39381	Goshen	8/7/2007	8/23/2007	negative
2007.157	WYSARECST05_Myacoba	Myacoba	<1	N 42.12903 W 104.39365	Goshen	8/7/2007	8/23/2007	negative
2007.158	WYSARECST01_Soybean	Soybean	<1	N 42.13118 W 104.40018	Goshen	7/17/2007	7/24/2007	negative

* Additional inspection dates occurred for some field locations (avg = 2.14 visits per field); only the first two dates are listed.

Table 2. 2007 CAPS field survey summary for detection of bacterial wilt (Curtobacterium flaccumfaciens pv. flaccumfaciens) of dry edible or common bean (Phaseolus vulgaris) in Wyoming (G.D. Franc, et al., U. of Wyoming, Dept. of Plant Sciences, Laramie WY 82071).

2007 Bean Bacterial Wilt (Curtobacterium flaccumfaciens) Survey Summary	
Report Generated:	3/5/2008 10:48
Data Range:	7/13/2007 - 10/10/2007

* Generated by Wyoming Pest Detection Program - www.uwyo.edu/capsweb

	C. FLACCUMFACIENS FIELD VISITS		NEW COUNTY
COUNTY	NEGATIVE	POSITIVE	RECORD
ALBANY	0	0	NO
BIG HORN	80	0	NO
CAMPBELL	0	0	NO
CARBON	0	0	NO
CONVERSE	0	0	NO
CROOK	0	0	NO
FREMONT	0	0	NO
GOSHEN	28	0	NO
HOT SPRINGS	4	0	NO
JOHNSON	0	0	NO
LARAMIE	0	0	NO
LINCOLN	0	0	NO
NATRONA	0	0	NO
NIOBRARA	0	0	NO
PARK	155	0	NO
PLATTE	0	0	NO
SHERIDAN	0	0	NO
SUBLETTE	0	0	NO
SWEETWATER	0	0	NO
TETON	0	0	NO
UINTA	0	0	NO
WASHAKIE	0	0	NO
WESTON	0	0	NO
YELLOWSTONE NATIONAL PARK	0	0	NO
TOTAL	267	0	0

C. flaccumfaciens was not found in Wyoming in 2007

125 Fields were examined for C. flaccumfaciens in 4 Wyoming Counties

267 Field visits were conducted

1 Field was in Anasazi Beans
2 Fields were in Black Beans
10 Fields were in Navy Beans
1 Field was in Northern Beans
5 Fields were in Mayacoba Beans
103 Fields were in Pinto Beans
2 Fields were in other Dry Beans
1 Field was in Soybeans

0 Field visits were conducted by WY USDA APHIS PPQ
267 Field visits were conducted by University of Wyoming
0 Field visits were conducted by Wyoming Department of Agriculture
0 Field visits were conducted by Wyoming CAPS / Pest Detection Program
0 Field visits were conducted by Joint State and Federal Agencies
0 Field visits were conducted by Wyoming Weed and Pest

Figure 1. 2007 CAPS field survey map for the detection of bacterial wilt (Curtobacterium flaccumfaciens pv. flaccumfaciens) of dry edible or common bean (Phaseolus vulgaris) in Wyoming: all sites were negative (G.D. Franc, et al., U. of Wyoming, Dept. of Plant Sciences, Laramie WY 82071).