SPUD

Reflections on the Montana Seed Potato Program

by

Orville McCarver

December, 2006

Acknowledgements

There are names of people who have assisted very much with certification but are not listed in this writing. Omission is not at all intentional in any way. Also, there are several that have given me help in quite a number of ways. I owe them much. One is Dr. Don Mathre, plant pathologist and Department chairman, now retired from MSU. Growers have cooperated very much. Thanks to Helen, my first wife, who passed away in 1998, and to Kerin, my second wife, who has been of much help. And to all wives of our growers. Any mention of any person, grower or non-grower, is meant for the entire family or families.

I owe much to Dr. Mike Sun who has headed the MPIA or certification since 1978 and has done an excellent job.

Tons of "saleable" spuds are donated to our various charitable organizations. Many thanks to them.

Thanks to those who went before me. I took advantage of the experience of Mr. Isaac and others. I was advised by the best.

Orville W. McCarver

I'm Orville McCarver. First I will give a little history of myself. In 1956, I came to work for the Montana Cooperative Extension Service and was stationed in northwest Montana near Flathead Lake in Lincoln and Sanders Counties. A little over a year later, I was transferred in the fall of 1957 to the state office in Bozeman, working out of what was known as Montana State College at that time. My duties included adult education on fruit and vegetables, ornamentals and some work on forestry. I also gave a course on potatoes. I was automatically made secretary/treasurer of the Montana Potato Improvement Association, which called for several duties that I will describe later. I spent thirty years with potato certification and it was quite an interesting career.

POTATOES AT HOME

I was brought up on a farm in Arkansas. Every spring my father planted red potatoes. We also planted a second crop of them which we harvested in late fall. My father always planted certified seed in spring grown in Nebraska or North Dakota, and sold in burlap bags. Of course, the tubers were unwashed so they had much dark gray to black soil on them. I wondered why he used certified seed, why it came from North Dakota or Nebraska, and why they were unwashed. So after working in potato certification for thirty years, I think I might have an idea. Back then I knew nothing about any potato pathogens; however, I did notice that every plant looked about the same in size, shape and color. Therefore, I assumed that either no pathogens existed or else every plant was infected.

HISTORY OF POTATO CERTIFICATION IN MONTANA

Certification of potatoes started in Montana in 1921. It was administered by the Department of Horticulture, with the cooperation of other departments on the campus of Montana State College in Bozeman (Montana Improvement Association Application – next page). Involved in this work in the early 1920's were Professor Harrington, C. C. Starring, and H. E. Morris. In 1926, the Montana Cooperative Extension Service opened the position of Horticultural Specialist. The duties *included potatoes.* The certification program was turned over to him, but members of the Department of Horticulture staff continued helping with field inspection. This position was filled by Mr. Edward E. Isaac until 1953 and half time until 1963. Also, the green house testing or indexing was done by the Department of Horticulture.

Professor Frank Harrington, Mr. Isaac, and Mr. Irvine of Irvine & Cottom in Dillon, Montana conferring on matters related to potatoes.

1922

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MONTANA POTATO IMPROVEMENT ASSOCIATION

Application Blank

I, Frank M Kerr, wish to grow 8 acres of potatoes for certification and declare my willingness to abide by all rules and to carry out all directions of inspectors; to make payment of fees when due and to do all those things which are necessary in the production of certified potatoes. In case field is rejected by the inspector, fees which have been paid shall be retained to defray expense of inspection.

NAME Frank M Kerr Post Office Burns Mont.

Varieties to be Grown Triumph

Character of Seed Used. from certified stock grown on alfalfa ground, first crop of potatoes ever grown on this plot and for 10 years back.

What Was Grown on Ground in 1920? alfalfa In 1921? alfalfa

Frank M Kerr.
(Signature of Grower)

Application Received _____

Note

Any member who shall deliberately make a false statement to, or shall purposely fail to perform any rogueing, grading, sorting, or any other duties as assigned by the Inspector, shall be denied further right to have stock certified.

Application fees must accompany this application. If already a member of the association, this fee is $4.00. If not a member, an additional dollar for membership fee in the association must be included, making $5.00 in all.

1923

MONTANA POTATO IMPROVEMENT
MONTANA POTATO IMPROVEMENT ASSOCIATION

Application Blank

I, A. H. Small, wish to grow ten acres of potatoes for certification and declare my willingness to abide by all rules and to carry out all directions of inspectors. In case field is rejected by the inspector fees which have been paid shall be retained to defray expense of inspection.

NAME A. H. Small Post Office Creston County Flathead

Varieties to be grown Netted Gem

Character of seed used Certified seed grown in a seed plot under Flathead Seed Improvement Assn, direction & Insp

What was grown on ground in 1921? Wheat In 1922? Barley

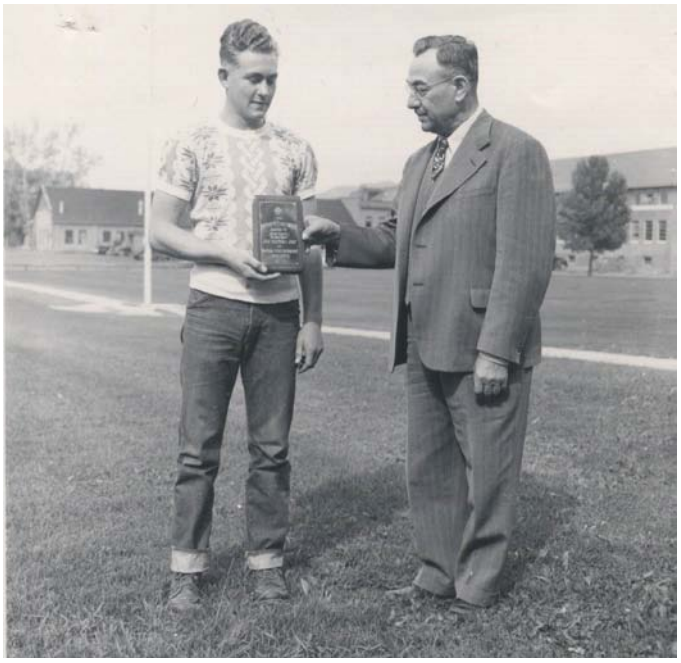
A. H. Small
(Signature of Grower)

Application received _____

Note.

Any member who shall deliberately make a false statement to, or shall purposely fail to perform any rogueing, grading, sorting, or any other duties as assigned by the inspector, shall be denied further right to have stock certified.

Fees as indicated on page 3 must accompany application.



Mr. Isaac, Orville McCarver's predecessor, giving an award to Jerry Russel in Big Horn, County, Montana.

Beside field inspection, certification included (1) isolation, (2) history of the seed stock, (3) sanitation, (4) insect control, (5) good storage conditions, and (6) winter trials in the south.

The principle diseases up until 1941 included several virus diseases including what was known then as "Rugose Mosaic", "Mild Mosaic", leaf roll, and several other virus diseases of lesser importance.

Planting of tuber eyes in the early greenhouse indexing program.

In 1927, "Greenhouse Indexing" was started by Prof. Harrington. Hills were selected, dug, and bagged separately by growers. One tuber was taken from each bagged hill and grown in the greenhouse at Montana State College. (The first greenhouse was located where the Ag Auditorium in Linfield Hall is now).

Numbers of all tubers putting up normal shoots were saved, i.e. the corresponding bags were saved and planted back as "Foundation Seed". Those showing any signs of Mosaics or other diseases, or any distinct abnormality in size, shape or color were discarded. According to reports from Mr. Isaac and Prof. Harrington, there was as much as 65% mosaic infection in the state.
This selection and testing method brought it down to near zero. It was, and is still known, that virus diseases can proliferate quickly.

Growing out plants in the greenhouse indexing program at Montana State College.

Other diseases of concern included Black Leg, Fusarium, spindle tuber, and some of lesser importance such as Calico, Haywire, and Witches Broom. In my 38 years of inspecting fields, I saw very little Spindle Tuber, so evidently greenhouse indexing and Foundation Fields kept it low.

Then, in 1941, a new highly infectious bacterial disease entered our state with a vengeance – bacterial ring rot. The original source of this disease was Europe. Reports are it moved to Canada, North Dakota, and then Montana. Of course, it was not long until it was reported in every state, proof of its reputation for being highly infectious. In two or three generations, it can wipe out a stock entirely.

This problem came when growers were asked to grow more for the war effort, when the potato industry really needed more and better seed. As an emergency measure, the Montana State Dept. of Agriculture provided a tag for "Seed Potatoes". About the only requirement was to pass a "NO RING ROT" test. So, commercial growers got seed (not certified) during the war years.

This disease had its economic as well as social impacts. First, it was not taken too seriously by some people. Mr. Isaac often said we still have "non-believers". He and other inspectors went into valleys and condemned nearly every certified potato field there. Naturally this was very disheartening to growers, and it was very economically hard on them, too. A few blamed the inspectors for the problem, i.e. if they or the inspector failed to detect it, the problem would not have existed. This disease still exists in some areas of the country because it is highly infectious and because some say that "two generations do not hurt". It can be or is carried on used burlap bags, crates, old equipment, cellar walls, floors, truck beds, and any other place where diseased potatoes have been. So, the cleaning up process can require much work, chores, and cost, too.

STATE DEPARTMENT OF AGRICULTURE INSPECTION- HORTICULTURE PLANT AND QUARANTINE SERVICE

All produce that is shipped into the state of Montana as well as all produce shipped out of the state must be inspected. This includes our certified seed potatoes. The service is administered by the state Commissioner of Agriculture in Helena. He in turn hires a chief inspector who has several inspectors under him. The two inspection services cooperate closely. The state Agriculture Department looks for off-types, rot, discoloration, size, cleanliness, foreign varieties and foreign matter in the tubers.

In most states the certification of potatoes is done by the same persons or inspectors that cooperate with the Federal Inspection agency out of Boise, Idaho. Montana is one state where the certification is done by university persons. Their duty requires the inspection of all produce, and not just potatoes. Chief inspectors included Robert Young, William Knapton, Gerald Kaiser, B. Jorgeson. Thank goodness they were cooperating inspectors.

HORTICULTURE INSPECTORS

They included Professor Frank Harrington, Dr. Vincent Iverson, Edward Isaac, C . C. Starring, G. Statchwick, G. R. Barnard, Homer Metcalf, and Leonard Yager. The two inspectors, Isaac

and Yager, in 1956 and 1957, showed me numerous things that inspectors look for in fields. In the fall of 1957, I was moved from the Flathead Valley to the State office at Montana State College in Bozeman, and promoted to Extension Horticulture Specialist, replacing Mr. Leonard Yager. One of my duties was to head up the seed potato program. My area of work was statewide. That was when Mr. Ed Issac, who retired in 1952, still worked half-time. He was the founder of the Montana Potato Improvement Association.

PERSONNEL

Professor Frank M. Harrington, Horticulturalist, Montana State College, Bozeman

F. L Taylor, Assistant Agriculture Agent, Chicago Burlington and Quincy Railroad Co.,

W. N. Purdy, Gallatin Valley Seed Co., Bozeman

H. E. Morris, Plant Pathologist, Agricultural Experiment Station, Bozeman

C. C. Starring, Assistant Horticulturalist, Agricultural Experiment Station, Montana State College, Bozeman

J. G. Cronk, Grower, along the HiLine.

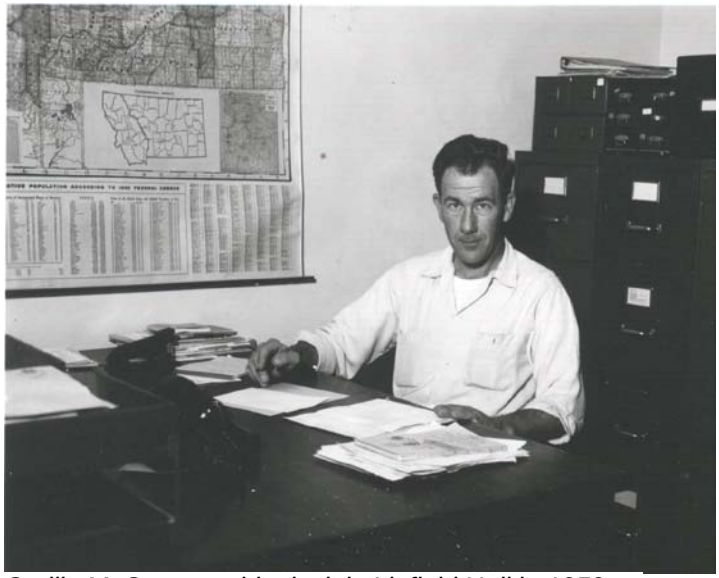
W. E. Pollinger

E. E. Isaac, Extension Horticulturalist, Montana State College, Bozeman

D. E. Willard

W. P. Stapelton, Northern Pacific Railway

WHY DO WE NEED SEED CERTIFICATION?



Orville McCarver at his desk in Linfield Hall in 1959.

In the fall of 1957, I came on the staff from Kalispell to Montana State College, Bozeman. My position was Extension Horticulture Specialist. Seed potato certification had been carried out in our state for about thirty-five years: A lot happened in that time. There were changes or innovations which continued after I came on board, which I will discuss later.

Improvements included greenhouse indexing and fertilizer trials, which were all very productive. Growers had

valuable knowledge of the composition of our variable soils, the correct spacing of rows and hills, planting depths and how to manage various plant stresses. The general quality of potatoes is dependant upon stability of growth factors (water, soil, and air temperature).

Growers also faced other problems too, such as drought, early freezing or field frost and controllable weed problems. They also had to contend with the ever-continuous burden of sanitation. They had to avoid any means of microbial movement(s) from any other source. The purely commercial growers did not need to be concerned with these issues as did certified growers.

Generally speaking, potato growers are like other farmers and are quite independent. Advice to newer growers came from several experiences. We had "local leaders" who helped those of lesser knowledge and experience. The "leaders" helped them acquire good planting stock, and knowledge of several other things which had to be done such as pest(s) control, proper planting, harvesting, storage, growing, and the acquisition of inputs. Mostly these exchanges of advice are informal. It was neighbor-to-neighbor deals which I think, showed good leadership.

In the 1920's and 30's, the County Extension Service throughout the state helped certification through the 4-H clubs. Their acreages were small but good. Some clubs had only one or two acres. They were advised by their respective county agents. Thanks!

WHAT SEED CERTIFICATION MEANS

In the case of potatoes, certification means that a certain seed potato stock has been inspected several times by unbiased neutral personnel. It involves knowing the history of the particular potato stock. It concerns the operation of the grower, i.e. is it sanitary, is he doing everything that he can to keep potato diseases from his premises. It involves a determination of whether a variety is pure since we don't want mixed varieties. Keeping the varieties separate from all others is important as it is in all other kinds of seed certification. Users of certified seed potatoes want to know about the individual that grew them, how they were stored, how they were handled in general, and of course, a history of the seed stock. He also wants to know how the owner operates, and his affiliations in the seed trade.

DUTIES OF THE CERTIFIED SEED GROWER

The certified seed potato grower must be very careful 365 days a year (and 366 days a year on leap year) of what comes to his/her cellar. Does he want a dirty sack or a used sack? No, not at all or any used container unless it has been sterilized. Does he allow a pair of shoes or footwear to come into his cellar without being sterilized? No. A commercial grower might not mind as much about these things as the certified seed grower. The certified seed grower does not borrow or lease used equipment that might contaminate their crop. He possibly owns a steam cleaner which is a good way to clean. If he is going to use an instrument or equipment other than his own, of course, he steams it. But certainly he/she never should borrow a digger or a planter from another person or store without making sure it is sprayed and disinfected before coming to his storage buildings or field. Another thing that the certified seed grower does is to use only clean conveyances. When trucks come on their farm to pick up a load they should spray the tires and

the bed with disinfectant which protects the seed potatoes the farm has grown and are shipping to their customers.

CHANGES IN THE CERTIFICATION OF SEED POTATOES

Ever since 1921, there have been many changes made in the certified seed potato business. For instance cutting of the seed potato used to be done with roller blades. They were cut continuously with just about the half of the disk of the cutter in disinfectant. Now they have large cutters that do that. Other innovations came about when the entire potato industry developed them, while others came only to the certified seed grower and didn't matter as much to the commercial or table stock grower. Other changes that were made included a conversion to a two row, and later on four row, planters and harvesters. Now there are four and even six row planters and harvesters that they use in the potato industry in general. Seed growers have taken advantage of that and bought planters that can plant four rows at a time. Even a fairly large grower needs only four or five days to get his crop planted. That's quite an improvement on what they called the old type planter and other types like the picker planter that are not used as much as they were because other planters are available Yes, they use the planter only four of five days a year and they sit maybe 360 days of the year but yet, it pays to have a good planter, because they produce more even stands In older planters perhaps the downspout would clog and hold back seven or eight seed pieces and you'd have a skip. And then later on they will let out all at once and plant seven or eight seed pieces all together. That's not so good because you will have an uneven stand, so even if you don't use it, it pays to have a good planter six days a year.

Walt Mangels plowing his potato fields with horses

Bill Cottom, Sr. using a two row assisted planter in the 1930's

Harvesting potatoes in the 1930's on the Cottom and Irvine farm near Dillon, Montana

Early Harvester

Early one row potato digger

Wooden hopper planter

Walt Mangels with potato fork

Walt Mangels and his son Gil with early equipment

Harvesting by hand on the Irvine & Cottom farm in the 1930's.

Pickers working in pairs in the 1930's.

Field harvesting by hand in the 1930's.

Dr. F. M. Harrington (left), Chief of the Department of Horticulture at Montana State College checking different fertilizer treatments for yield, type, uniformity, William L. Irvine (right) is looking on.

Hand harvested bags of potatoes on the Irvine & Cottom farm for shipment to Argentina.

Visitors in 1937 to the Irvine & Cottom farm. From left to right: F. H. Bateman, Greenlock, NJ – President of the National Potato Growers Association; F. M. Harrington, George L. Knight, Chief, Division of Horticulture State of Montana; V. E. Iverson, Assistant Horticulturalist at Montana State College; D. L. Johnson, Agricultural instructor at Dillon High School, E. E. Isaac, Extension Horticulturalist; Wm. Irvine, Bernard Williams, Beaverhead County Agent.; Philip B. Cottom.

Loading potatoes from the field to be taken to the cellar on the Irvine & Cottom farm.

Jim Fleming's truck loaded with sacked potatoes weighing about 25 tons.

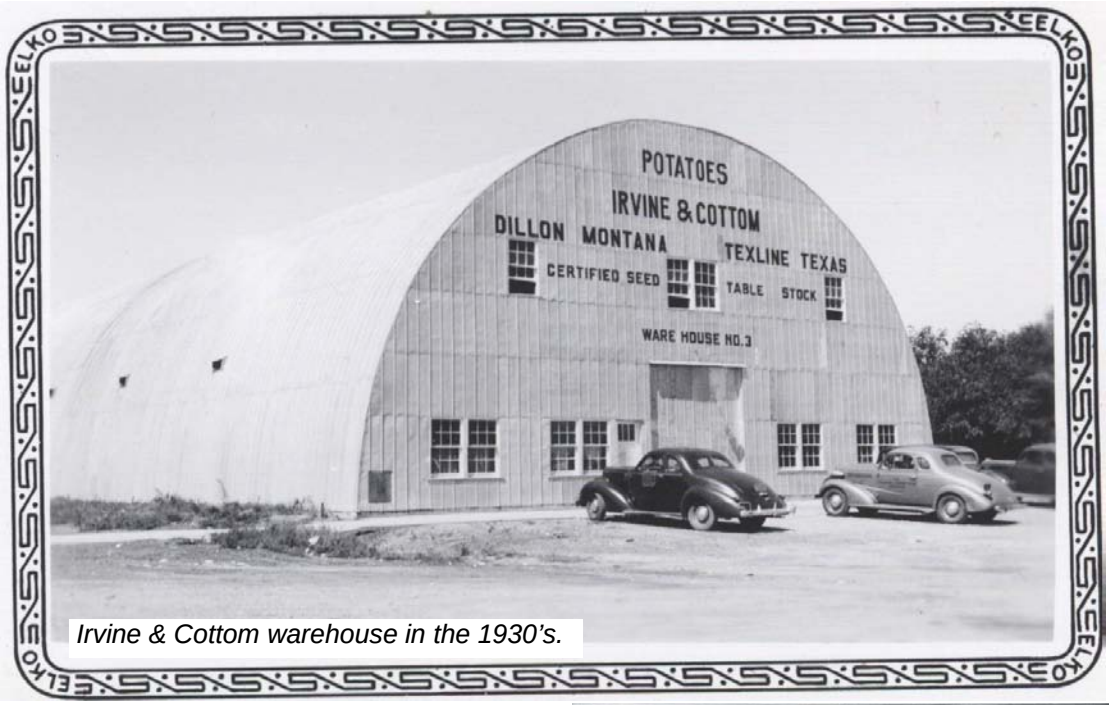
Loading seed potatoes in refrigerated rail car for the first stage of the trip to Argentina from the Irvine & Cottom farm

Roguing crew removing all abnormal plants in the late 1930's on the Irvine & Cottom farm.

Early day sorting of potatoes on the Irvine & Cottom farm

100 lb bags of seed potatoes loaded on farm trucks in spring of 1967. Trucks are owned by Walt Mangels, Gil Mangels, Chuck Caffrey and Paul Caffrey. Potatoes were hauled to railroad siding at Pablo, two miles south of Mangels and Caffrey Brothers Farms. The refrigerated railcars hold up to 500 bags of potatoes.

Early 50's - Art Mangels standing beside truck wondering when someone is going to help unload irrigation pipe.



Irvine & Cottom warehouse in the 1930's.

Hand cutting seed potatoes

An early day tuber cutting machine

Orville McCarver examining an early potato digger.

HISTORY OF THE MONTANA POTATO IMPROVEMENT ASSOCIATION (MPIA)

Since 1921, the organization involved with potato certification in Montana has been known as the Potato Improvement Association, which administered the objectives up until the late 1970's. Then due to legislative action, potato certification was administered by a potato board, appointed by the president of Montana State University. It is administered through the extension horticulture program and with the aid of other personnel on the campus who are trained in items such as plant physiology, plant pathology and other specialties, which we will discuss later. In potato improvement, in general, there are four objectives. One is to produce certified seed potatoes, the second is to use certified seed potatoes or to encourage the use of certified seed potatoes, the third is to encourage research, and the fourth is to provide education about potatoes.

The duties of the administration or the head of potato certification ranges from everything from bookkeeping to field inspections, education or advising growers of techniques. He or she also inspects the fields and cellars, which will be discussed later. The duties are quite numerous and sometimes they involve complex problems such as soil problems, fertilizer problems and any other problems and things that can go wrong with the potato plant including diseases and qualities that hit potatoes, including adverse weather. We may ask why a commercial grower in the state of Idaho, Washington, Oregon or Wyoming would want to buy certified seed potatoes to plant. Why doesn't he simply plant back his own? Well there are places where that could be done, but for many places that cannot be done because the seed may contain high amounts of viruses, and other diseases. The grower needs to get good seed when he can in order to grow good crops, so we sell almost 100% of our potatoes for certified seed.

In the state of Montana our weather can be quite cool, especially at night, and it is true that our seasons are a little bit short for growing a long season variety, even though we do. Because we have cool nights and cool weather in general, we have fewer problems with disease-spreading insects, such as aphids, than they do in some states where they grow a lot of commercial or table stock potatoes. Also as a result of our cool nights and cooler weather we produce potatoes that are high in solids. Some are known to get up to above 26% solids, i.e. tissue without water. If you had a potato with 24% solids then that potato would be 76% water. Some varieties are down to 19% solids and maybe down as low as 17% in some places where others have been known to get up to 27%. So Montana grows certified seed potatoes and we ship them to other states and provinces, and have been doing so since 1921.

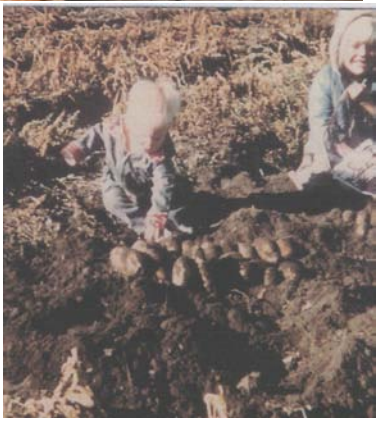
MONTANA LEGISLATURE

An important change came in 1951. The Montana legislature made certification of potatoes (and other seed crops) "legal". Montana State College (now University) was put in charge of the program. The Administration appointed the Dean of Agriculture to designate who would run the program. In turn, it was turned over to the Extension Horticultural Specialist to be an official or Secretary/Treasurer of the program and funds, but with a Board of Directors to advise and give the program counsel and guidance (see page 44). Before I, Orville McCarver, came on the job in September of 1957, I knew that potato improvement was officially a part of the job as Extension Horticulture Specialist. The association was known as The Montana Potato Improvement

Association. It had four objectives: (1) to certify potatoes, (2) promote the usage of certified seed potatoes, (3) to promote education in potatoes, and (4) promote research on potatoes.

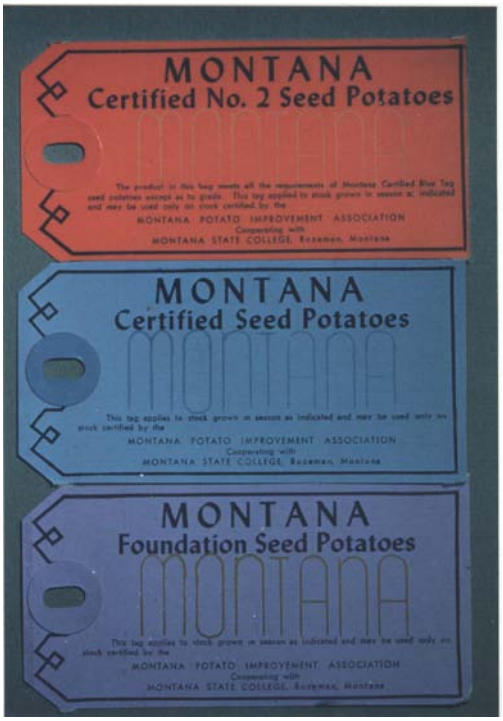
SPUD FARMING HAS COME A LONG WAY since George Mangels used the scale his grandson Art is leaning on. The scale and sacks are part of a display at the Miracle of America Story Museum, owned by Art's brother Gil. The men's grandfather was one of the first in the area to start raising certified seed potatoes, back in 1922. (Rich Stripp photo)

Sacked and weighed seed potatoes.



Rene and Angie Mangels helping dig tubers by hand in seedplot - October, 1975.

Early testing of seed potatoes. The seed pieces will remain in the sand flat for 24-48 hours to allow the cut surface to heal. Then they are pushed into the sand, covered, and left until sprouts and roots form.



Tags used for sacked certified and foundation seed potatoes used prior to bulk shipping.

Greenhouse indexing in the 1960's done by Russ Sylvis, greenhouse foreman, in the Ag Experiment Station greenhouses in Bozeman.

Russ Sylvis and Mike Sun in the late 1970's looking over plants in the greenhouse indexing program.

Marking seed pieces for greenhouse indexing

Years later, only certification was used in official rules, a change which may or may not have been for the better. The legal interpretation of the objectives permitted only certification, with no education, promotion, or research.

For years, this arrangement prevailed. A good relationship between the Board of Directors and Montana State University personnel existed. The greenhouse indexing program continued until more technical labs were built in the 1970's. Marion Breedin was the first greenhouse foreman involved in the indexing program. We held down diseases, but did not and have not wiped out any of them.

Much was done involving potato certification in the 35 years before I came on the job. In the 35 years after I came there have been many changes. As in most professions, I had to learn the meaning of so many new words, clauses, and terms, such as "how is the set", the set meaning the number of tubers per hill. They said, "Well they cut well" which means that during the cellar inspection the tubers with the end cut off looked good. Yet in so far as I know there was nobody who held my ignorance against me. Evidently my predecessors and inspectors preformed fairly in dealing with growers. They notified the growers when to expect them, and they communicated with the growers giving them good council or useable information. So I had some large shoes to fill, but for me the overall situation was good. My predecessors did a fine job establishing the Montana Potato Improvement Association (MPIA) and my thanks go out to them.

Those who stayed in potatoes, despite discouragements, had perseverance. Besides removal from certification due to something such as bacterial ring rot, many growers have been "frozen out" due to early freezes in the fall. In fact, this has put many growers out of the potato business, and even some out of farming.

Up until about 1973 we had "dry land" or non-irrigated growers. There were those drought years when they got little or no yield. Other factors or problems included herbicides and hail.

Montana is often looked upon as a grain-grass-livestock state. So several "persistent" herbicides have been used on grain and grass fields, and along roadsides and irrigation ditches and thus are persistent in the soil for years. Unfortunately, potato growers have at numerous times leased such ground and consequently have been badly hurt. Several of these chemicals carry over to the next generation through seed pieces. Others have been hurt by drift from spray applications, and from contaminated irrigation water. So, we learn the hard way. Modern methods can become costly when not used or applied properly. Several growers declare that no distributor or sales

person or agent informed or warned them to refrain from using these materials in and around potato fields, or future potato fields.

POTATO SEMINAR

In 1966, we had our first potato seminar held in Deer Lodge, Montana. We got personnel like Earl Spencer, Doyle Burns from the National Potato Council, and other people who were quite knowledgeable about potatoes and potato seed certification. We presented programs at the seminar in 1966. The seminars have been going on every year since. We got more buyers and growers together than we ever had before. We have covered many subjects that are relevant to potatoes and have gotten some of the best speakers that there are for our seminars. They are still going today.

All growers were assigned roles. All carried them out well. I was very surprised at the turn-out and enthusiasm there. We had over 250 at the evening banquet. We had commercial people with useful exhibits. The Annual Potato Seminar was repeated at Deer Lodge through 1972.

All growers and families at Deer Lodge contributed to the Seminar. Leaders included John Vanisko, Francis Koehnke, Carl Meyer, Gene Bennett, Al Donich, Glen Launderville, Andrew Nicoles, Bud Jacobson, Bud Beck, Charles Beck, Frank Lovell, Melvin Reisted, Robert Johnston, County Agent Harold Strobel, and Don Temcke. Their families also participated.

Since 1972, the Seminar has been rotated every two years at Bozeman, Kalispell, Missoula and back to Deer Lodge. It has enlarged every year. People come from Idaho, Washington, Oregon, Canada, and other states. Subject matter items have been numerous—law, electronics, experts on diseases, insects, weed control, irrigation, storage, all kinds of machinery, bruising,--you name it. We have had very good to excellent speakers on the program.

Besides being educational, I have detected other benefits from these Seminars. Of course, buyers and growers came closer, and communicated better. They realized there were good seed stocks available and seed renewal became easier.

Trade personnel helped in several ways. In November of 1995, the 30th Seminar was held. The success of these meetings, I feel, has been and still is above my expectations. They have opened up lots of knowledge.

PROGRESS

In 1922 Montana had 29,000 acres, almost all of it in commercial potatoes. Today we have about 10,000 acres of certified seed potatoes.. In the 1920's we were producing about 100 cwt per acre. Today we get up to 300 cwt per acre and some growers get more.

There were times in the 1920's when the environment was rampant. Some stocks were said to contain as much as 65 percent mosaic. Now we see large fields without any pathogens. Montana growers export approximately 3,500,000 cwt of certified seed annually. The number

of acres certified has grown every year from 1921 thru 2000. In that period, there have been no years when Montana had no acres of certified seed potatoes.

As the years went by there were more gradual changes. Prior to the 1970's many of our storage facilities were "Idaho pole" cellars. They were built with poles, straw, brush, and earth. Most floors were earthen. Though these were simple and low-cost structures, they surprisingly kept potatoes well. The earthen floors, and sometimes earthen walls, seemed to have an ever stabilizing effect on temperature and humidity. Both are very important in storage requirements. This is not to discredit modern storage with automatic and electronic controls as well as the latest building materials.

Pouring concrete for the Lake Brother's storage facility near Ronan in 1994.

Montana lagged behind other states in permitting bulk shipping of seed potatoes. For about three years there was much discussion of it. It was a topic at at least two of our Potato Seminars. In about 1971 bulk shipping was predominate here, but under several close conditions and limitations. Needless to say, it has saved many dollars in costs of bags, filling, handling, and removal from bags. Yet, many contend that the burlap bag gave tubers "protection".

MARKETING SEED POTATOES

It has been said that when and where there is anything worth buying, somebody will be there to buy it. Perhaps!! But it has been demonstrated that advertising and promotion helps too. We need promotion for potatoes too.

Some growers do contend that they as individuals have built up a good representation for their seed with some buyers; therefore they do not need the support or help of any organization to sell their seed. Such grower-consumer relationships should not be impartial. Several active buyers have informed me that they like to shop areas with several growers for greater choices. If only one grower exists, there are fewer choices.

For most years, one receiving an "average seasonal price" could do fairly well. For instance, in the fall of 1958 prices were extremely low. Some did not even bother to harvest. But the following April prices went very high and some who held their crop did well. Conversely, in the fall of 1960 prices were very high, but dropped the following spring. So, one selling through the winter may hedge and do all right most years.

There are three ways to sell potatoes. (1) Retail - A shopper carefully picks out a 5-10 lb bag of "spuds" at the super market. (2) Wholesale buying – done over the telephone such as between a buyer in Chicago and a seller in Southern Idaho. Neither of the first two care much about who the individual grower is so long as they meet Grade Requirement. (3) Then we have the Seed Buyer or shall we say the Industrial Buyer. They want to know everything including the grower's name, history, reputation, and their general operation practices and they cannot settle for "A pig in a Poke". So, I have enjoyed meeting many seed buyers in the fields to see what to expect. Such on-going communication between grower and buyer makes for good understanding and appreciation of each other.

WHAT BUYERS EXPECT WHEN A BAG IS SHIPPED

1. The designated number of containers (bags) not under weight.
2. Excess soil on tubers; though some growers have told buyers that the price of top soil is greater than the potatoes. But buyers say they cannot convince their bankers of that.
3. The "pack" Buyers much dislike foreign matter such as bottles, rocks, or any other such material in the pack. Neither would I.
4. They detest a varietal mixture. Only a very small amount of "off varietal" tubers are acceptable. Why would any grower mix them?
5. If consumers are deceived by only one or two growers, they hold it against the entire growing area. So we always have promoted standardization. Buyers have always liked consistency.

CHANGES IN MARKETING AND MERCHANDISING

When I came on board, potatoes in general (table stock and seed) were bagged and shipped out, mainly by rail. Today most are shipped by truck directly from the seed grower's storage to the huge mechanical cutters. Seed went into 100-pound bags. Now they are shipped in bulk. Once prior to my time potatoes were put into barrels with 165 pounds per barrel. In the 20's seed potatoes were sold by two negotiating parties. Today many are sold by contract.

INNOVATIONS IN HARVEST

Other innovations that have been made in the production of seed potatoes is in the harvest. Growers now have huge machines that can harvest four rows at a time instead of the one or two row harvesters they once had. Another great improvement was with planters. Some of the old ones were still being used when I came on in 1957. In addition, another new thing involved some research by the late Professor Harrington, Mr. Isaac, and some of the Experiment Station personnel such as Mr. Wes Roth. They found out a whole lot about fertilizer. Instead of using only 40 or 50 lbs per acre, they used a much higher rate than that along with a much heavier seeding rate. This resulted in much more tonnage per acre. Furthermore, by using more seed (almost double the normal rate), they found out that their total yield was greater and the tubers were smaller. (See page 45).

SOME MYTHS ABOUT POTATOES

1. "Do not plant after Good Friday". Truth: It is done every year on a broad scale.
2. "If two seed pieces get planted in the same hill, the progeny will be a hybrid" Truth: No matter how close the seed pieces are to each other, there is no crossing. Each variety will remain the same.
3. "Never apply any water after the plants have bloomed". Truth: It's done extensively with no evidence of harm.
4. "The potato is fattening" Truth: Only seasonings applied to them may be fattening. The potato itself is very low in fat.
5. "Potatoes grown for seed or under the certification program are inedible." Truth: Only tubers that have been treated with pesticide(s) in preparation for planting cannot be eaten. Certified seed potatoes not treated with a pesticide are no different than commercial potatoes and many of them are sold and used for the table market.
6. "The best way to grow potatoes is to spread seed (pieces) on the ground and cover them with straw." Truth: Growers who plant them five inches down into the soil have sold millions of dollars of potatoes. I have never known of anyone making that much using the straw method.

CAN A CROP OF POTATOES BE PRODUCED WITHOUT USING CERTIFIED SEED?

It is possible and has been done. Some commercial growers have managed to keep a stock clean. Yet a grower would forego the benefits of isolation and sanitation which results in things like fewer disease-spreading insects. A grower located in a cooler mountainous and isolated area might carry a stock several years without getting infections. However, the grower located in a

damp and warmer area might never survive disease spread. Also, he/she could have a nearby neighbor(s) who has disease-carrying stock. Some growers make timely recommended sprays against several insects, foliar diseases (blights) and even rouge out diseased plants. And some treat the seed before and after cutting the same as certified growers do. So certification is not indispensable.

GEOGRAPHY

Certified potatoes have been grown in most counties and many valleys of Montana. During World War II there were approximately 10,000 acres in the Milk River Valley alone. The principle varieties were Reds (Bliss Triumph, Pontiac). After World War II, growers faced competition from the Red River Valley. The Montana growers had a freight rate disadvantage, and less yield per acre. In addition, all growers were forced to mechanize more. Automatic seed cutters, planters, and harvesters soon became universal. A larger acreage is now required for one family farm to justify modern machinery. It seems that no one single area (valley or county) has captured certified seed potato production.

In 1958, there were about 1,400 acres of potatoes in the Deer Lodge Valley. Now there are less than half that many. Then there were four growers in Gallatin Valley but now there are 20. Then Flathead County had approximately 1,000 acres in potatoes. Now there are about half that many. So, the industry does shift geographically. Montana had some research on potato production early, but not enough. In 1956, growers were using something like 40 lb of nitrogen per acre. Today they use over 200 lb per acre. The recommended seeding rate was approximately 1,000 lb per acre. Today it is approximately double that. In the mid 1950's yields were something like 220 lbs per acre. Today they are near 360 lb. So, the balancing of growth factors (water, nitrogen, phosphorus, potash, heat units, sunshine) with the seeding rate may not be determined with only one or two seasons of experiments.

SEED GROWN UNDER "DRYLAND" CONDITIONS

Without watering, we often find seed crops with tubers that are "Rough" and of poor type with knobs, growth cracks, deep eyes, and are tapered and finger-like. These potatoes are more difficult to cut and have poor disposition of eyes than are smooth and normal type tubers. Yet growers have used them with good results. They emerge and produce a good vigorous stand. They might be as low in disease content as any stock of potatoes, including certified potatoes. However, the potato industry accepts that they are still lower in price than normal tubers. This is called "cosmetic". Mr. Isaac recommended producing and maintaining cosmetic as well as possible. Other cosmetic features include flabbiness due to a lack of humidity in storage. A very limited amount is tolerable. Sprouting tubers, too much soil stuck to tubers, internal bruising of the stem end of tubers (caused by sudden kill of immature vines) and mechanical damage (cuts, bruises,, gouges) can also develop in seed stock grown under dry conditions.

WATERING

As compared to dry land potatoes, applying water from a ditch, well, or stream or other sources has been said to increase yield as much as five fold. With watering, the need for fertilizer is also

increased. We seed to balance the growth factors as close as we can. Over-watering can be costly in at least three ways. First, it water-logs the soil causing an anaerobic (no air) situation. This in turn leads to rotting and other injuries to the plant roots. Second, it takes or flushes out much of the costly nitrates and potash that's needed for normal plant growth. Can you imagine nitrate deficient plants when 100 pounds of nitrogen has been applied per acre? Third, it pollutes ground water. How much? Anywhere from one to two inches of water per setting is the ballpark depending upon drainage, or a lack thereof. Some soil is over-drained and some under-drained, yet some are neither. So frequency and amounts of water per application need to be adjusted accordingly.

LIGHTNING

Approximately once a year, I ran onto a spot hit by a bolt of lightening. Symptoms are variable. Often all plants are dead, stunted, or wilted. One time, I found a spot where it hit, went down tow rows about one hundred feet, jumped over tow adjacent rows and caused another spot. Of course, I was never sure which spot was hit first. Often the tubers will be stunted, their flesh blue and the vascular ring rotted. We can't stop mother-of-nature. No great economic losses.

HAIL

Through out the state the potato fields were hailed upon, as did lots of roofs, some years more than others. One year a grower was taking me to a sixty acre field near Polson, our arrival was perfectly timed. To get there we had to drive across a hay field. We soon parked and alongside the potato field. At the same time the hail hit, we had a "ringside seat". We watched the entire field go down. Eventually every stem was crushed, down, and limp. The plants first were from about twelve to fifteen inches tall before the hail came. It took less than one minute to bring them all down. This was the first inspection of them, three weeks later I did the third field inspection. It was hard to believe my own eyes. There was no evidence of hail damage. This goes to show you how resistant potatoes can be.

POTATO PROCESSING

Potato processing started during World War II but after the war when processing plants were built in Idaho, Washington, Oregon and other states there was no evidence that processing caused any changes directly. It did raise the consumption of potatoes in general. Per capita consumption had dropped from over one hundred pounds per person per year to less than ninety pounds per year. Evidently, working women played a part. When the benefits of processed potatoes and/or potato products were appreciated, this more than reversed this downward trend and consumption increased to more than one hundred twenty pounds per capita. Consequently, growers required more seeds.

In the mid 1940's after World War II, potato processing occurred more often. As a result many of our growers started contracting. This has helped in stabilizing the seed market. Also, potato processing has raised consumption from around 90 lbs per capita to about 130 lb.

CHANGES IN SEEDING RATES

In Montana, growers once seeded less than one thousand pounds per acre. Now the seeding rate is about double that amount. The use of nitrogen fertilizer once was only forty to fifty pounds per acre. Using such low fertilizer and seeding rates, growers were getting lower yields per acre. But by increasing nitrogen to over one hundred pounds and seeding rates to about two thousand pounds per acre, growers got greater yields of saleable potatoes. When growers increased their nitrogen fertilization but did not increase their seeding rate, they got high production but their tuber size varied a great deal. Inversely, to increase seeding rate to about two thousand pounds instead of one thousand pounds, but not increase the fertilizer rate, you could expect numerous tubers but very small ones. So by increasing the rate of fertilizer and seed, we increased yield per acre of saleable sized potatoes.

Let us just imagine a grower using the old seeding rate of 1,000 lb per acre with the modern rate of fertilizer. The results could very well be a few football size tubers. Conversely, imagine the old fertilizer rate (40 lbs) with the modern seeding rate (2,000 lb). This would no doubt result in a field of numerous but very small potatoes. So, by increasing both the fertilizer rate and the seeding rate, we get more saleable potatoes.

TUBER DISEASES

A tuber from any source may be infected with a disease. but it may not always show symptoms. But cut a tuber up into four seed pieces and plant these pieces in four consecutive hills. When the green shoots or stems get about eight inches high we may have all hills level and developing normally, and healthy. But then, maybe not. Four of the hills, or perhaps three, or two of them, or maybe just one of the hills may be infected. In that case, we can be fairly certain that the original tuber itself was infected so it is dug up and destroyed. No longer are you nervous about keeping the tuber or any of its progeny. In other words all four hills go. Sometimes you have three showing signs of disease and one doesn't, but you know it is very apt to have symptoms in it. A tuber unit program was developed in the greenhouse and in the fields. I understand that the late Professor Harrington started a tuber program in the greenhouse and in the fields and I give him credit for it. The growers grow their own tuber units in the field and carefully take care of them like a good gardener takes care of a bed of roses. The tuber unit method has definitely proved to be very effective. Of course, today there are much more modern ways of testing a tuber.

MERCURY

The entire potato industry once used compounds of mercury for seed piece treatment. And of course they were very effective, but they tend to build up in the soil and they are deadly poisonous. The use of mercury seed piece treatments is now banned and growers are now using less toxic materials that are still strong enough to kill or inhibit micro-organisms such as fungi and bacteria.

BLACKLEG

One problem in the potato industry, among others, is a disease known as Blackleg. It is caused by a bacterial organism, and according to Dr. Morrison in Colorado, it can be isolated from snow banks up on mountainsides and from the top of fence posts. However, when I came on in 1957 it seemed like nobody was bothered by Blackleg. It did look terrible, I thought, and I didn't know how to do any research on it, but I do take some pride in my Blackleg readings. It is not logical that there are some times when you see a good stock of potato seed which was moved to another grower and the load was split. One grower would have lots of Blackleg and the other wouldn't have any. You could have two stocks of potatoes, one would have Blackleg, and the other wouldn't. There again you would blame it on the seed. I did take notice over the years that Blackleg seemed to be where there was cattle manure the previous winter. In a one hundred and sixty acre field I walked across it from corner to corner. Up until the far corner I saw no Blackleg what so ever, nothing that even resembled a Blackleg plant, but as I got to the far corner it was there and there were potholes where water stood and there was lots of Blackleg. If the whole field had been that way there would be no way that we could have passed it for certification. We turned down whole fields for Blackleg quite a bit. It seems logical that it is perpetuated in manure (cow or others), and is in a swampy place or wet place in the field. Sometimes it just shows up there and nowhere else in a big field. Sometimes with the same seed stock used the grower would have Blackleg in one field while other fields would have none. We are beginning to find out that Blackleg follows anything that is slimy or rotten and is perpetuated. You can take a stock that we haven't seen Blackleg in for years and it gets some field frost in it, such as an early frost, and it causes some of the potatoes to rot. With field frosted and rotten tubers the grower will clean out the rotten tubers and run them, but some growers will run them and grade them out and still have some rotten tubers. If they plant the seed next year, they will have considerable blackleg in them where there never was blackleg before. As I said I was not hired to do research and I really didn't do anything myself about Blackleg except observe it over the years and over many fields and combinations. It is true that Blackleg, like many people said, is not as infectious as ring rot and some of the other insect carried diseases that we have to deal with. My contention is that it looks bad at least, and it is not as infections as some other diseases but I am still concerned about it. It's true that we have hundreds and hundreds of acres that we can walk all morning and never see any Blackleg so I'm glad that I've been concerned about it and we will probably never get rid of it entirely.

RINGROT

The Bacterial Ring Rot problem continued to raise its ugly head off and on for three decades. It seemed that every time it came in we had from two to five or six growers who would get hurt before it stopped. Ring rot hurt us in another way which may sound peculiar. In some cases, there were numerous charges, allegations, claims, and even law suits when there was no Ring Rot at all since several things cause tubers to rot. Some were based on ignorance, i.e. "we do not know what it is and do not want to find out, so let's call it Ring Rot". Some alleged that Ring Rot exists in every seed stock shipped. They said it was a method of "keeping the growers and inspectors under continuous pressure, or to keep them alert". One potato official informed me that this was a good incentive method. I strongly disagree! Miscalling a disease either way is neither good or fair anytime, anywhere.

Then there were those who did have Ring Rot, but had seed from several sources—even from several states mixed together. Yet, they attempted to say which stock was the cause. Thus, of course, in several cases the grower was stuck with an excellent potato, but with no market. Several plaintiffs have gone to court even though they had no problem at all.

VARIETIES COME AND GO

In the 1950's came Early Gem (susceptible to cracking), Centennial Russet, Cascade, and Nooksack. The Norgold Russet became quite popular as an early potato and stayed popular until the mid 1970's. Newer red potatoes of the 1950's included McClure, Norland, Chieftain, and LaRouge. Earlier we had Bliss Triumph (Red). Numerous people have informed me that it is "the best flavored potato of all". It went out mainly because of its scab susceptibility and tendency to have deeper eyes.

Older varieties include Irish Cobbler, Early Ohio, Katadin, White Rose, Triumph, and Bliss Triumph, Pontiac, and Russet Burbank. The latter has always been and still is the most popular variety grown in Montana and the Pacific Northwest in general. In Idaho, it is known as Idaho Russet. It stores well, has high solids, and is good for boiling, baking, and frying as well as in the processing trade, in general. It continues to dominate despite newer varieties being introduced annually. Contrary to many predictions that it would be obsolete many years ago, we still enjoy it.

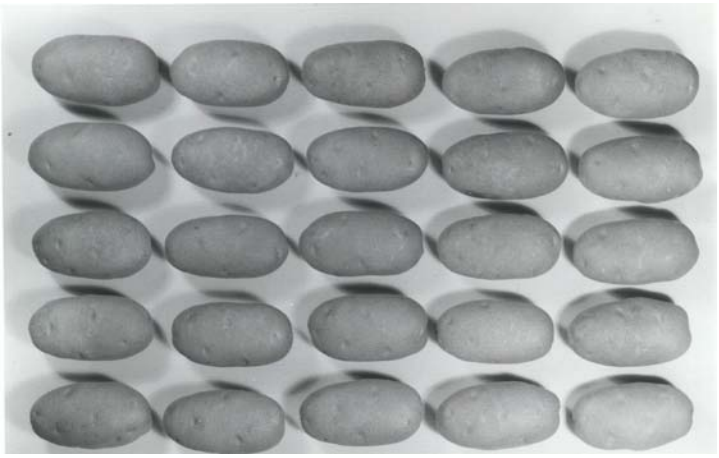
EDUCATION IN POTATOES

A judge once said "It seems one needs an education in order to grow potatoes". Previously I cited many problems the grower must face. Of course controlling insects, diseases, and weeds alone requires more than just lay knowledge, but there are still lots of others. Holding down the lesser diseases, such as black leg, requires knowledge and skill as well. I wish I had made a listing of all that I have heard. Several have told me that: "When we grew at home we used only manure and dug potatoes as big as your head, but such is no longer done". Since you can hardly sell potatoes that large now, our growers use more seed, get more tons and more tubers with less size, ie useable size. Not last or least: "The planting of potatoes in the dark of the moon causes a 200% increase in yield". I fail to understand why exactly 200%. Why not 207%, or perhaps 196%? But not 200% exactly everytime!!

POTATO EXHIBITS OR SHOWS

Through the 1920's, 30's and 40's potato exhibits were quite significant at most county fairs in Montana. In addition, they were important at the Harlem Seed Show in Blaine County. Today that Show is still going strong, but not so many potatoes are exhibited there. Nevertheless, the first show starting in 1950 was primarily, if not entirely, a potato show. Later, a similar seed show was started and existed for several years at Kalispell in Flathead County. Potatoes were one of the more important seed exhibits there.

Judging potatoes at the Harlem Seed Show. Woody Ekegren on the left, Orville McCarver in the center, and Roger Cronk on the right.



Russet Burbank potatoes in the Kalispell Seed Show in 1958 showing the uniformity of these potatoes. From the Art and Irvin Bauer farm.

Carbon County Seed Show

TESTING FOR LATENT VIRUSES USING MODERN LABORATORY TESTING METHODS

In 1966, Dr. Richard Hamilton introduced the meristem method of developing potato plants absolutely free of all virus and virus-like diseases, including those with symptoms visible to the naked eye and those that are not visible, ie they are latent. This program was already active in Nebraska, and a few other states, as well as in Canada. So, in 1967 the Board of Directors of the Montana Potato Improvement Association appropriated funds to get this program moving. Soon, Dr. James Shepard replaced Dr. Hamilton, and set up a testing lab in the basement of the Experiment Station greenhouses, and with the help of his assistant, Gary Secor, virus-free stocks were dispersed to growers. Dr. Shepard's main contribution to the virus testing program was the development of the radial diffusion test. This was used to detect potato virus X (PVX) and was so cheap and easy to use that literally hundreds of thousands of leaves could be tested over a 6-8 week period in the summer.

Later the program was taken over by Dr. Larry Claflin, then Dr. Dallas Bachelor, and now Dr. Mike Sun (see page 46). The program has grown tremendously. They moved from the basement lab in the greenhouse to the buildings at the old Poultry Farm near the campus of MSU, and from there to the present location in the new Plant Growth Center. We now have the most modern lab of its kind and category in the United States. The number of meristem-derived plants sent out annually approaches 20,000, and has been as high as 132,000. The number of plants in the field that are virus tested annually approaches 400,000 to 500,000. We now have Nuclear, G1, G2, G3, and G4 fields. Winter tests were conducted near Oceanside, California for many years, but are now conducted in Hawaii. Currently, the lab crew is using an ELISA test to check the leaves for both PVX and potato virus Y (PVY). This test has replaced the radial diffusion test and is also quick and relatively cheap such that they can check 300,000 to 400,000 samples each summer.

WHO WERE AND ARE OUR CUSTOMERS?

Most of our seed has gone, and still goes, to Washington and Idaho, but some goes to California, Oregon, and to several other mid-western states. Montana has been mostly a seed growing state since World War II. Here are some of the reasons: (1) We are too far from large commercial markets to compete, though we do ship 50 lb boxes to Texas and surrounding areas. (2) Some years our seasons are short, resulting in tubers too small for commercial trade, but are a good size for seed. (3) Due to our cool climate and short growing seasons, we do not have as many vectors (insects) carrying disease causing organisms as do other areas. (4) We grow a "high solids" tuber which is conducive to very viable seed. With these four attributes, it is a compatible situation for Montana to supply the seed for other areas in warmer climates.

WHO SHOULD AND SHOULD NOT GROW SEED POTATOES

Of course no person should pursue any livelihood or career unless he or she can enjoy it. So, first, one must enjoy potatoes lest he be tortured. Secondly, potato operations require fairly good land, a fair amount of capital and long term facilities. Many of our modern potato machines—planters, harvesters, loaders, sorting tables, storage facilities, and other items have no alternative uses. So, before investing one must decide to stay in potatoes.

Counseling of those considering entering into potato production involves numerous questions. All must face the facts of risk in production and of marketing. Several years the costs have been more than price. Yet quite a few newcomers do succeed. Some have started with an older grower, perhaps for a percentage of the crop. Some are close to older growers receiving constant and detailed advice from them though no bonds may exist between them. Others are in another business, like cattle or grain, but want to diversify so they plant potatoes and succeed. Some, like Henry Ford, start with only a few acres and gradually build up to fair or optimum sized operations. Yet some have said, "Think I'll jump in the potato racket for a year or two", and sure enough some do and some end up shirtless. Reactions to good price years attract some newcomers into the business that should not come in at all.

FIELD INSPECTIONS

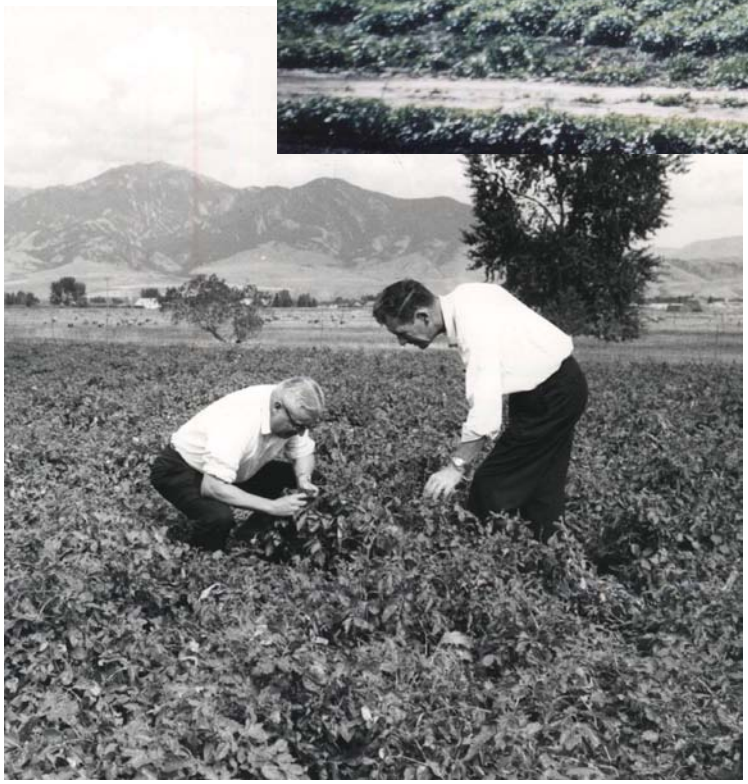
The purpose of inspectors, besides searching for diseases or other abnormalities, includes extending useful knowledge to the grower. Knowledge is supplied through many channels. Besides the inspector, there are agents selling chemicals, machinery, and other inputs, local tours, including those at the Experiment Stations, potato conferences in other states where education programs are given, literature from various sources, conversations or sharing with neighbors, speakers at local potato association meetings, and not least our State of Montana Potato Seminars. The inspector's work is twofold: (1) regulatory, and (2) educational or academic.

Methods of field inspection have changed some, but not much. Then and now the inspector walked across the field at least once, depending on the shape of the field. Then and now every row was seen or crossed. However, since 1976, Montana has copied other states in that the inspector counts the number of plants seen in his or her path which may be as much as 15-20 feet on either or both sides depending on the direction of light. All inspectors choose their own "route" across a field. No grower knows where an inspector will go - and shouldn't. Traditionally three field inspections are made, though the rules and regulations specify at least two.

Jim Fleming (left) and Earl Spencer in Jim's field in the Flathead Valley

Dr. Iverson and Bill Hocker (hat) in Hocker's field near Ronan in the 1960's.

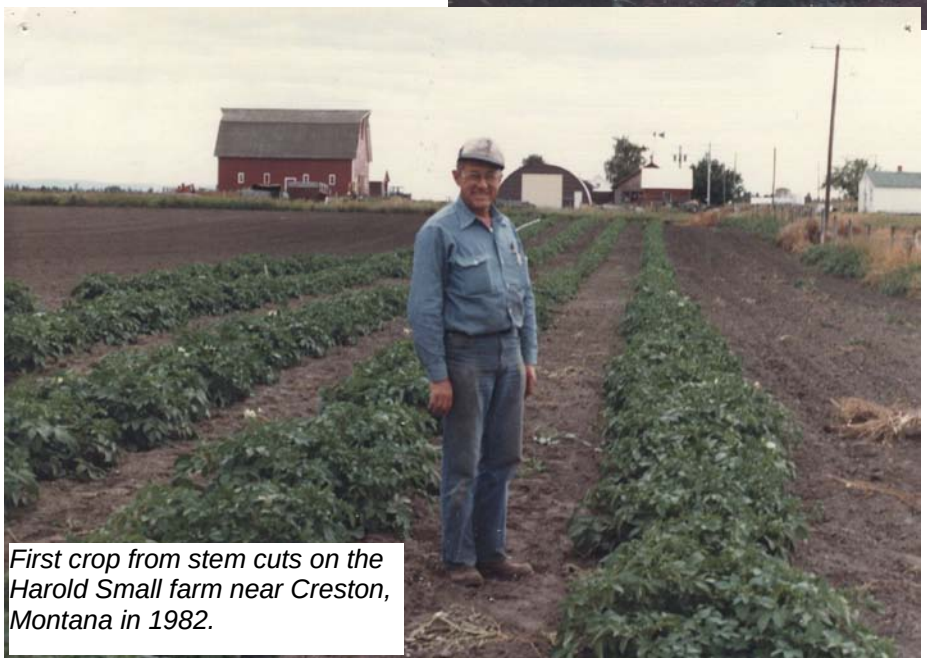
Hocker's field near Ronan in the 1960's



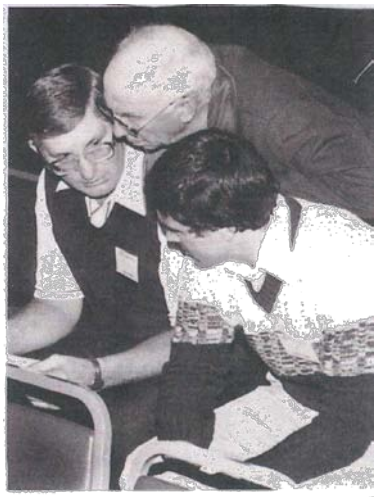
Dr. Iverson and Orville McCarver doing field inspections in 1963 in Gallatin County, Montana.

Uniform rows of potatoes on Walt Mangels' farm in the 1950's.

Arvil Anderson, St. Ignatius



First crop from stem cuts on the Harold Small farm near Creston, Montana in 1982.



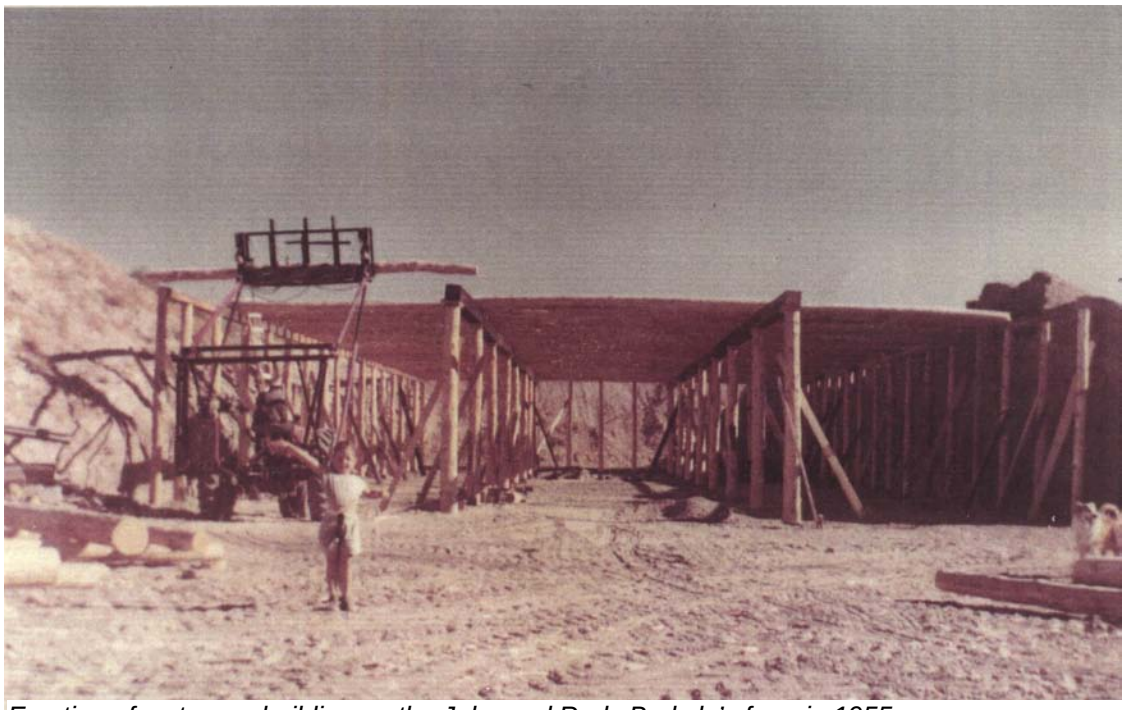
Herb Koenig (left), Kalispell; Wal
Mangels (standing), Polson; and Tom
Van Aken, Whitefish.
18 SPUDMAN 1/82

Learning what to look for is important, and so is identifying abnormal situations. There are many minor defects such as hail damage, wheel injury, “big foot”, cultivator damage, insect damage, light frost, herbicide stress, and others.

CELLAR INSPECTIONS

Cellars have always been inspected at least once. Usually, if any disease is not found in the field, then it will not likely show in storage. There are exceptions. At least ring rot has been found four times in cellars but not in fields. Net necrosis caused by the leaf roll virus from current infections tends to show after a month or two in storage. Otherwise, bin inspections are to check for proper storage conditions—temperature, relative humidity and ventilation and to see that piles are level.

Early day potato storage cellar in Blaine County, Montana.



Erection of a storage building on the John and Rudy Broksle’s farm in 1955.

Leonard Salmon and his nephew, Ted Salomon rouging potatoes the easy way.

Darrell Logan, Flathead area potato grower

Jim Fleming, Pablo, Montana working in his fields.

Rex Campbell (left), Wayne Gibson, Vince Iverson, and Jim Fleming (right) about 1965 in Jim's field , Lake County, Montana.

Let's compare old methods versus modern ones. We are proud of our new facilities, but not

100%. As late as the early 1970's there were still a few growers using hand pickers. Of course, this involved picking tubers up by hand and putting them into field sacks of about 50-60 lbs per sack. Now it is done with a large combine which digs, lifts, conveys and drops the tubers into truck beds. With the old method there was much less bruising and other mechanical injuries of tubers. There were no vines, clods, rocks, or checks of sod, just tubers in storage. Bruising is still a problem.

The old hand-cutters were slow and involved lots of labor. But with the rolling cutters, the seed pieces were more uniform and the cutters were continually sterilized. No chips (tiny seed pieces) existed. This made for a better or more even stand of potatoes.

Weed control with modern chemicals is good, though costly in two ways—actual dollars spent for materials and applications and retardation of plant growth resulting in decreased yield. However, the old hoe method of weeding could, under certain conditions, cause molestation of the potato hills, drying out tubers resulting in reduced yields.

THE IMAGE OF THE MONTANA CERTIFIED SEED POTATO GROWER IN MONTANA

People in all walks of life may, to some extent, feel observed and often criticized without appreciation for their status, without understanding, and little or no technical or scientific knowledge of their livelihood. This is true about potato growers. They are looked on as "Wealthy Americans". Critics fail to realize that potatoes are an intensively cultivated crop. Costs are high per acre. But perhaps the most biased concept that has happened about potato operations is that "all" land in potato production should be taxed higher than land just like it and alongside of it, though not in potatoes. More than once county officials have proceeded to raise taxes on land used for potato production. State law definitely says that land must be taxed on the basis of capability to yield. I have seen many potato fields on very low-productive land—such as over-drained, gumbo, high salt concentrations, very heavy clay with virtually no organic matter, wet land, and very rocky land. Conversely, I've seen many farms of very deep, fertile, highly productive loam with no potatoes. In fact, we may see fields of excellent soil covered with weeds. Growers enjoy good images too. Charitable organizations have always received potatoes from local growers for little or no cost at all. This trend was and still is. Our growers have helped the needy.

FERTILIZER

In 1961 Montana shipped around 500,000 cwt of seed potatoes to other states from approximately 2,500 acres. Today we ship approximately 3,000,000 cwt from almost 10,000 acres. This reflects more acres and more cwt per acre. This increase has been quite steady and gradual over a 35 year period since World War II, much of it due to use of fertilizer.

FAMILY OPERATIONS

By family operations, I mean generation upon generations. Today we have 20 operations run in part or full by second generation, 15 by third generation, and one by fourth generation families. Surely this is a good record. About 50, or over one half of our growers in 2006, are descendents of older certified growers.

Quite a few people that grew certified seed in the 1920's, 30's, 40's, and mid 50's have or did have descendents involved in certification today or sometime prior to today. The list below includes families where some Great Grandchildren were involved in the certification business. For instance, John Weidenaar passed away in 1963 but his sons Jack and Dean took over the operation. Later we lost Jack but his son Brian took over and is growing potatoes today. Brian is being assisted by his son of the fourth generation of the Weidenaar's, so descendents help keep certification going.

List of Earlier Growers by Family and Descendents:

Family	***Address***	***Generation***
Anderson, J.		
Anderson, L.		Two
Anderson, W.M.S. *	Deer lodge	All Daughters
Bailey	Ft. Shaw	Two
Beck	Deer lodge	
Beck, A.		
Bosley	Harlem	Three
Burns	Creston	Three
Caffrey Brothers	Polson	Two
Callhan	St. Ignatius	Two
Clark	Creston	Two
Cook		
Cronk	Savoy	Three
Day	Bitterroot Valley	Three
Dewitt		Two
Eaton	Lindsay	Two
Erhart		
F.M. Sherfies		
Fleming	Pablo	Four
Ganm	St. Ignatius	Two
Gibson	Lindsay	Two
H. Parker		
Hab	Havre	
Hern	Polson	Three
HV Buck		
Irvine	Dillon	Five
Jacobson	Deer Lodge	Four
Jim Bailey	Ft. Shaw	
John Bailey	Ronan	Two
Kimm, S.	Manhattan	Three
Kimm, W.		Three
Koehnke	Deer lodge & Townsend	Two

Kubitza	Havre	
Kubitzn		
Logan	Kalispell	Three
Lovell	Deer lodge	Two
Mangels	Polson	Four
Meyer	Deer lodge	Two
Ownford	Bitterroot Valley	
Saloman. L.	Polson	Three
Schutter	Manhattan	Four
Small	Creston	Four
Snell	Creston	Three
Stam	Chinook	Two
Stark	Polson	Three
Starkel	Ronan	Three
Thompson		
Van Aken	Whitefish	Three
Venhuizen	Manhattan	Four
*Was the first to certify in Deer Lodge Valley		

Another thing that defies logic is a very sudden proliferation of “mild” and “rugose” mosaic in a stock - and why it will hit one grower hard and not another grower close by. I’ve seen it go from little or none, to extreme in one year. There must be predisposing factors somewhere - more than we know.

What are some parts I liked and some parts I disliked about the entire certification? Some parts were dealing with beautiful green potato fields. Of course, it was always good to see fields free of any diseases or any other adversity. Of course, a good price year made us all feel better. Then the potato seminar where growers got together and discussed their mutual problems and concerns.

Gary Enger, Rodney and Bud Jacobson, September, 1962. Rodney is in red shirt.

Of course having to condemn fields was not pleasant. Another adverse thing was for a person in and out-of–state would call plant ailing why it was ailing or call a certain pathogen falsely of course such is or was unfair to the owner and grower. Working with growers in and out was always peasant even when they we disagreed.

I’ve found the potato fascinating. There are a number of other things I do not understand about it, and likely never will.

Jacobson home ranch, 1962

Bernd, LeRoy, Bud, and Bob Jacobson

Bud, Fred, and Ted Jacobson inside cellar with dirt roof, 1961

Ted, Bud, hired hand, and Fred Jacobson sorting potatoes, 1961

LeRoy, Bud, and Bob Jacobson

MONTANA POTATO IMPROVEMENT ASSOCIATION
Seed Potato Certification--Year 1947
Bozeman, Montana

The following is a list of Montana growers whose potatoes passed required field inspections season of 1947:

Netted Gem Variety

Grower	Address	County	Acreage
William E. Anderson	Deer Lodge	Powell	80
James Ashton	Harlem	Blaine	5
John Bailey	Ronan	Lake	46
J. L. Bailey	Fort Shaw	Cascade	6
Anthon Beck	Fort Shaw	Cascade	8
Howard Buck	Columbia Falls	Flathead	18
James Canton	Stevensville	Ravalli	10
DeWitt Clark	Creston	Flathead	40
Alfred J. Donich	Deer Lodge	Deer Lodge	60
Abe Dubay	Polson	Lake	1
T. H. Durnford	LoLo	Missoula	3
Harvey Eliason	Deer Lodge	Powell	24
George Ferguson	Deer Lodge	Deer Lodge	16
Riley Hensley	Fairfield	Teton	2
D. A. Hern & Sons	Polson	Lake	51
Irvine & Cottom Co.	Dillon	Beaverhead	105
Fred D. Jacobson	Deer Lodge	Deer Lodge	50
William Koenig	Kalispell	Flathead	16
Glenn Launderville	Deer Lodge	Deer Lodge	20
B. H. Lichtwardt	Route 1	Lewis & Clark	9
LoLo Vigilantes Club	LoLo	Missoula	1½
George Mangels	Polson	Lake	3
Carl B. Meyer	Deer Lodge	Deer Lodge	130
Bert Murphy	Chinook	Blaine	5
John Pomajevich & Sons	Missoula	Missoula	15
Francis Rowley	Harlem	Blaine	10
John Schroeder	LoLo	Missoula	12
A.H. Small & Sons	Creston	Flathead	273
Echo Thornley	Harlem	Blaine	20
Wallace Tucker	LoLo	Missoula	1½

Kasota Variety

Herman Bloom & Sons	Musselshell	Musselshell	10

Sebago Variety

Irvine & Cottom Co.	Dillon	Beaverhead	10

List of potato growers in 1947

EARLY LEADING GROWERS

Small family at Kalispell
Mr. Irvine of Irvine and Cottom at Dillon
Phil Cottom
William Cottom
Jacobson family at Deer Lodge (Fred Jacobson and Sons)
John Schutter and family of Manhattan
Wilber Kimm of Manhattan
James Fleming and his brother Paul and Pablo
D. Walt Mangels and sons of Polson
Francis Koehnke of Deer Lodge, and later Townsend
W. M. Anderson of Deer Lodge
Carl B. Myer of Deer Lodge
Mr. Cronk and sons of Harlem
Roger, John and sons of Harlem
Frank Eaton and sons, of Lindsay
Don Gibson of Lindsay
Jim Bailey of Fort Shaw
Ed and Clem Dubay of Polson
Abe and Marion Dubay of Polson
Jim and Marge Treweek of Kalispell
Mr. Dewitt
Rodney Stan of Chinook
Kubitza and brothers of Havre
Eduard Kubitza
F. M. Sharples
D. A. Hern and sons of Polson
H. C. Bosley of Harlem
Arthur Haloemicht
Arthur Beck of Deer Lodge
J. L. Bailey of Pablo
Max Cook
H. L. Buck of Creston
Harold Parker
Erhart C. Meyer
Don Gibson of Lindsay
T. W. Thompson
T. N. Durnford of Bitteroot Valley
Leon Anderson
William Anderson of Deer Lodge
Jas. Anderson

POTATO FIELD INSPECTORS OVER THE YEARS

Frank Harrington
George Stachdwick
Leonard Yeger
Vinre Everson
Home Metcalf
Max Stark, Polson
Mr. McKee, Western Ag Research Center
A. L. Thompson, Montana State College
L. Elison
O. McCarver, MSC, MSU, 1957-1999
E. E. Isaac, 1926 until death in 1963
A. Fredrickson, MSU, 1967-1968
John Dunse. 1969-1970
Larry Claflin, 1971-1972
Dallas Bachelor, 1976-1977
Mike Sun, 1978 – present
L. Cook, 1985-present
W. Trank, Nebraska
Earl Spencer, Idaho
Gary Jensen,
Lloyd Pickett, MSU

Mr. and Mrs. Guy George, Sr., in 1970, Silver Star, Montana potato producers

Gilbert Mangels, Polson, Montana who runs the agricultural museum in Polson

Dan Callahan, St. Ignatius, Montana (right) potato producer, along with Orville McCarver

THE LACK OF POTATO PROCESSING IN MONTANA

In the late 1950's and 60's processing mushroomed in the Pacific Northwest. We got quite a few inquiries from various interest groups including Chambers of Commerce. Then we had approximately 10 chipping plants, but no others. All of them are gone now. There were then at least nine major limiting factors for a processing plant. We could have satisfied perhaps only five of them. Some we could not satisfy, including competitive freight rates, a large metropolitan area, alternative uses for the plant, a substantial labor supply, and others. Some day the winds may be blowing right for potato processing in Montana but not in the foreseeable future.

FINANCING OF CERTIFICATION

Evidently early certification was paid for by Montana State College. Later, a small fee was charged but it was in 1955 that the Montana Potato Improvement Board raised registration fees to $10, tag fees for 100 lbs to three cents, and acreage fees to $3 per acre. This enabled them to continue to carry Mr. Isaac half time, pay for travel for certification, pay for tags, buy an addressograph machine, and buy sand, peat, and top soil for the growth medium for greenhouse indexing. In 1958, they bought a sprayer for demonstration purposes for the Horticulture Station. As acreage and yields increased, they started paying more for indexing, helping some with research and miscellaneous items. That trend has continuously increased to the present, and the Certification Program (from growers) pays for everything—wages, salaries, equipment, and items for the office and laboratory. So, the potato program started out pretty much entirely dependent on Montana State College to the point now where it is about 100% self supporting.

HELP FROM OTHER DEPARTMENTS ON CAMPUS

The departments of Zoology and Entomology, and Botany and Microbiology (Plant Pathology) helped in many ways over the years. They provided testing of diseased tubers, prescribed methods of prevention and cure, and presided at educational meetings on pest problems. Later, the latent virus-free program was initiated and set up by the Department of Plant Pathology. Participants were Dr. Richard Hamilton, Dr. Jim Shephard, Dr. Larry Claflin, Dr. Dallas Bachelor, and now Dr. Mike Sun.

In many states the Certification programs are conducted by the State Department of Agriculture or the Division of Plant Industry, and usually from state Capitols—not from any state institution of higher learning. Here in Montana, it was placed in the Land Grant Institution because of resource people, laboratory facilities, educational facilities which our state Agricultural Division did not have. Nevertheless, our State Dept of Agriculture in Helena has always performed the shipping point inspections. Their personnel may not always identify the cause of abnormal color, but they do know their grade standards well. Of course, they are responsible for inspecting all interstate shipments of fresh produce to and from Montana.

CONCLUSION

Seed potato certification in Montana has been going continuously for over three-fourths of a century. Numerous challenges have been faced by growers, inspectors, and other concerned people—epidemics of diseases, droughts, freeze-outs, cost-price squeezes, failure to get paid, lawsuits, and other discouragements. Why has it continued? What is its future? What changes lie in store for it? I cannot answer the last two questions but I believe I can the first one. Basically Montana growers have always been willing to change to meet the demands of the potato industry. They innovate. They respond. They continuously improve. They have been staunch in staying. May they continue!

ACKNOWLEDGEMENTS

Thanks to Kerin McCarver, Amanda Kathryn Hanson (Orville's granddaughter), Irene Decker and Don Mathre for assistance in producing, transcribing, and editing of this publication.

Top of the Crop

This operation is no small potatoes.

by Marcia Krings, Assistant Editor

Greg Northcutt

JOHN SCHUTTER raises barley, wheat and alfalfa, but potatoes are his gravy.

Schutter, who moved to the Gallatin Valley near Bozeman from Holland 33 years ago, farms 1,700 acres of irrigated land. Mike Sun, Extension Service potato specialist, calls him "one of the most successful seed potato growers in the country."

Schutter has 450 acres in potatoes every year and has invested a fortune in equipment and storage facilities. His crew brings in 40 truckloads of potatoes daily during late September harvest. The spuds are stored in three huge, insulated, steel-sided buildings. Humidified air is kept at 40 degrees to insure proper storage. One warehouse holds 120,000 cwt. (hundred-weight) of Schutter potatoes until shipment to commercial potato growers begins in February. At prices ranging from $3.50 to $6.50 a cwt., that's no small potatoes.

Schutter, who calls himself a "gambler," loves growing potatoes.

"They're a lot more intriguing than alfalfa or grain," he says. "There's a lot more to it. There's risk in potatoes. It's a highly speculative crop. It's perishable. You can freeze out, drown out, or get set back by unexpected diseases. And prices fluctuate wildly. Usually, though, things go right."

Schutter plants his potatoes on a five-year rotation with wheat, barley and alfalfa.

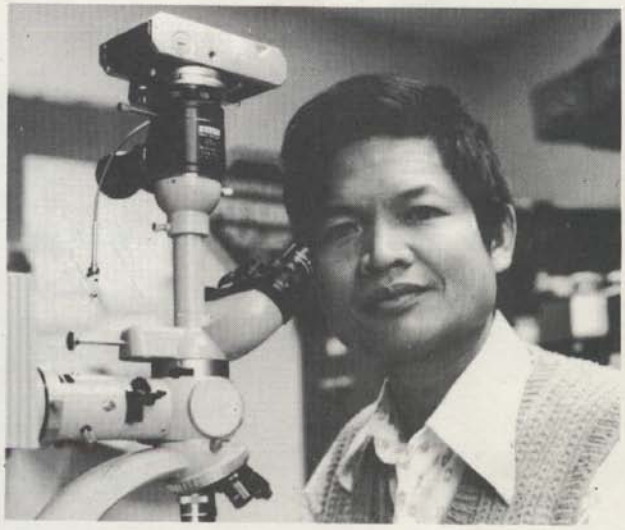
Before settling in Montana, Schutter was a plant breeder in the Netherlands.

There are no potato viruses on Schutter's farm, and to keep it that way visitors must wear plastic covers over their shoes and dip them in disin-

John Schutter (left) and crew haul in the harvest.

John Schutter, Sr. looking over his harvest in 1980.

Meet Mike Sun



Montana State Seed Potato Pathologist and Executive Director of the Montana Potato Improvement Association (MPIA)

The Plant Pathologist

Since Mike Sun joined MSU and MPIA in early March, he has spent 10 busy months continuously working with the 70 Montana Certified seed potato growers.

He has spent most of his time in the potato fields, storages, greenhouse and PVX-testing lab.

Mike Sun is no Johnny-come-lately to the world of potato disease and nematode research. He is a recognized plant pathologist and holds both Masters' and Ph.D. degrees.

Dr. Mike Sun did post-doctoral work for 2 years at NCSU on common potato virus-diseases. For an additional 2 years he worked on diseases of potatoes and other crops at the International Vegetable Research and Development Center in Taiwan.

Dr. Sun is currently a member of the American Potato and Phytopathological Societies and the Society of Nematologists.

The Improvement Association

As MPIA Executive Director, Mike Sun is responsible for overseeing Montana's 7,200 acre seed potato certification program. Fifty-five percent of the acreage is PVX-tested.

Since its founding in 1952, the MPIA has been Montana's official seed potato certification agency under the authority of Montana State University.

Both working together for the past 27 years to establish an improved disease control program, to modernize certification standards, and pioneer the PVX-research and testing procedure.

Advertisement placed by the
Montana Seed Potato Growers
Incorporated
—the growers' advocate

Planting Montana Certified seed potatoes makes sense for many reasons

High elevations. Isolated mountain valleys. Almost total absence of commercial potato growing. Very few potato pests. Three rigid field inspections. A winter southern test-plot and bin inspection.Strict sanitary procedures that require affidavits. A special ring rot detection procedure. And Mike Sun.

This all helps to put Montana Certified seed potato growers in a unique position of trying to produce seed potatoes as free of harmful diseases as currently possible.

If you want to plant Montana Certified seed in the spring, you should contract-purchase this winter to get the best lots. Place your order now with the seed grower or through his sales representative.

For more information about Montana Certified potato seed, write or call:
Dr. Mike Sun, Executive Director, MPIA, Johnson Hall, MSU, Bozeman, MT. 59715. Telephone 406/994-4832.

All Montana State Certified seed potatoes are sold pursuant to "the disclaimer of limited warranty and limitation of remedy" as adopted by the MPIA Board of Directors. See seed certification tag or uniform sales contract.

Seminer of Montana Potato Growers Draws More Than 160

Deer Lodge, Mont. – Potato men from Maine to Oregon were among more than 160 persons at the fifth Montana Potato Growers Seminar at the Deer Lodge armory November 12.

Montana State University is equipped to handle 400,000 leaf samples in 90 days, more than enough for testing to keep new seed virus free, said Dr. James Shepard, MSU botany and microbiology department plant pathologist. He said 220 sacks of virus - free seed reproduced from only two tubers went to selected Montana growers this year and are free of severe or visible viruses as well as latent viruses identifiable only in the laboratory.

Of 26 growers who had virus - free foundation seed this year only two had X or S virus infection and this was only "a couple out of hundreds," said John Dunce, graduate assistant at MSU who did field inspections.

"We have a good crop in storage, but not one that couldn't be improved upon," said Orville McCarver, Extension horticulturist. He said to get top yields growers must air for 14,000 to 16,000 healthy plants per acre without anything else in fields.

Mercury compounds almost certainly will be banned for wet treatment of potato seed, predicted George O'Leary of the Washington Potato Commission. He based the prediction on mercury found in game birds, and said he knows of no substitute in prevention of rhizoctonia.

Growers will continue to depend more on chemicals than cultivation to remove competition for potato plants, predicted M. J. Jackson, Extension state weed specialist. He said machinery should be calibrated under field conditions.

"Water does more good, or more harm, than any other factor in potato growing," said Richard Ohms of Boise, Idaho Extension potato specialist. He said proper irrigations can be five to 31 days apart, depending on season and temperatures.

Montana has the worst phosphorus deficiencies he has seen in 20 states, said Donald Bakes Jr. of Pocatello, Simplot Co. representative who talked on fertilization. He cited experimental results of up to 580 sacks per acre.

A system which works one year for disease control may not work or even be needed the next, said Earl Spencer of Idaho Falls, Idaho Crop Improvement Association representative. He said the best control of diseases is an ideal environment for the plant.

"You are selling 80 per cent water in a skin," said Walter Sparks, Idaho potato specialist.

Sparks said losing water hurts potatoes, and they need high moisture but no free water during storage.

John Vanisko, Deer Lodge grower, was emcee for the banquet in the Elks hall and moderator for a panel on marketing. Other members were Carl Doud of Quincy, Wash., Lamb - Weston Co.; Walter Mangles, Polson grower; Bud Jacobsen, Deer Lodge grower, and Gibb Monroe of Moses Lake, Wash., Sun - spiced, Inc.

POTATO MARKETING IS PANEL SUBJECT – Bud Jacobsor Deer Lodge potato grower, is shown answering a question at th final session of the fifth Montana Potato Grower Seminar in Dee Lodge. Members of the panel on marketing, left to right, ar Jacobson; Carl Dowd of Lamb - Weston Co. of Quincy, Wash Walter Mangels, Polson grower; Gibb Monroe of Sun - Spiced Inc of Moses Lake, Wash., and John Vanisko of Deer Lodge, pane moderator.

Monroe is a native of Bozeman and graduate of Montana State University.

C. W. (Wes) Roath, who recently retired as superintendent of the Northwestern Montana Branch Agricultural Experiment Station, was presented a travel case from the association. James Fleming of Pablo, vice president, said Roath's research with potassium stopped hollow - heart problems and was of great benefit to Montana potato growers.

Over 250 growers from across North America attended this years meetings.

Potato industry leaders share ideas.

Seed Growers Improve Skills

Marketing tips, disease control discussed at North American Seed Seminar

The plight of a seed potato grower is somewhat unique. Not only does he have to contend with pests, disease, adverse weather conditions, unpredictable growing seasons and depressed prices, but he has to try to market his crop to other growers who are trying to cope with the same problems.

Thus, marketing is a critical part of a seed grower's operation.

van der Zaag

During the fourth annual North American Seed Potato Seminar held in Denver, Colo., Dec. 5-7, growers from across North America received advice on how to market potatoes, as well as information on other important topics relating to the seed potato industry.

Ed Walsh, marketing consultant from Marion, Ohio, told the group of about 250 growers who attended the seminar that it is the little things you didn't do that you should have done, or the little things you did that you shouldn't have done, which makes the difference in whether or not you made the sale.

Walsh discussed the "Do's and Don'ts" of selling. He outlined his presentation in four categories—getting ready to sell, making sales calls, presentations and closings, and what to do after the sale.

Proper grooming is very important, Walsh explained. "Appearance makes an important impression." Walsh said a good salesman will dress just slightly better than the person he's trying to sell. Also, a proper mental attitude is important.

Walsh said it takes an average of 12 calls to get three presentations to get one sale—12-3-1. But you must get out and make the calls if you want to make the presentations and eventually make a sale.

Since making the calls is so important, and Walsh explained the telephone is perhaps the greatest sales tool, he said scheduling your time will help you make your calls.

"The only time you're selling is when you're talking to your buyer."

Walsh also explained the importance of first impressions.

"You never get a second chance to make a good first impression." He also explained that when you make a sales call, always leave something with your name on it in case your potential buyer forgets it.

Walsh said when it comes to making presentations, you must choose your words carefully. "Don't ask a buyer to "sign" his name. He may be willing to "write" his name, but everyone is reluctant to "sign" it."

Never ask yes/no questions, Walsh explained. And never mention the competitor's name. Other things to avoid are smoking if the buyer isn't smoking, chewing gum, being interrupted by outside sources during a sell, having a clock in view of a buyer, and being phony.

"Price is not a selling factor," Walsh explained. "But what is, is the value you get for the money you pay." He said during a sales presentation, you need to give the buyer seven chances to say yes to the sale. But once he has said no, don't try to change his mind. Wait for another day.

Ed Walsh

Finally, Walsh said a return call five days after the sale of the product is delivered goes a long way to ensure repeat business. Find out if the buyer is happy with the product, if he received what he was expecting. "Repeat business is the secret of success," Walsh said.

The world market was discussed by D.E. van der Zaag, coordinator of potato research with the Ministry of Agriculture in The Netherlands.

The developing areas, such as China, the Middle East, Africa, etc., have historically