

KENOSHA POTATO PROJECT 2012

With Curzio Caravati

Kenosha, Wisconsin USA

June, 2012

[Music plays; various video shots of Curzio working with the potatoes, etc].

Curzio: Gardeners.com [www.gardeners.com] is an employee-owned company based in Burlington, Vermont. This is the back page of the catalog that shows the growing bags. Growing bags are used to grow potatoes, tomatoes, peppers – and I have been so fortunate to be able to work with them and test the potato bags, the bags to grow potatoes. It really works for me because it's easier for me to tag and control potato varieties grown in bags that grown in a traditional way.

This is the Kenosha Potato Project, and we are working for Gardeners.com, who is the manufacturer of a potato growing bag. The purpose of this test is to find the way to grow higher yields of potatoes in bags. What you see in front of you are 100 bags, and there are 100 different varieties growing in these bags. Every bag has a tag. This one, for instance, is La Ratte. They are in alphabetical order. Here is La Veine Rose and this is Lauterbrunnen, and so on.

What we want to see is how potatoes grow in these bags, how well they develop a vine, if they develop a flower, if they develop a seed berry. We're going to come back to that later in the season; you will be able to see what a seed berry is. And most interestingly it will be to see, when we harvest, where potato tubers develop – if they develop at the very bottom of the bag, or if they develop higher up. Obviously we are going to have higher yields if the potato variety grows tubers higher up.

So my project started with my involvement with Seed Savers Exchange. Seed Savers Exchange has a collection of over 600 varieties of potatoes, and I grow about 300 varieties of potatoes here at the Kenosha Potato Project.

Many of these varieties are heritage. They are maybe 50, 100, 150 year-old potato varieties that are not grown commercially any more. And the reason why potatoes, these heritage potatoes are not grown commercially anymore – the reasons may be small yields or they are maybe more affected [by] viruses. But definitely one of the problems is that some of

these varieties will set tubers high, which is an inconvenience for the farmer because tubers – vines that set tubers high will turn green. And that's exactly what we need; we need potato varieties that set tubers high so we can increase the yield by using bags.

Each bag is labeled with the name of the variety so that through the growing season I can monitor how the vines develop, and if they set flowers, and more interestingly, if they will set berries.

Bags come in different colors because we believe that the different color may affect the temperature of the soil, and we know that potatoes are affected by very high temperatures, so tan bags or red bags may have a lower soil temperature than black bags.

Each bag has a volume of 60 quarts, or 15 gallons. Growing medium can be compost and dirt, some fertilizing material that is mixed in. And the top of the bag is filled with what we call shading medium, because the potato needs to grow in fertile soil, but then the tubers can develop on top of it in a shading material that prevents the sun [from] turning the tubers green.

We believe that this wood chip creates almost a lid on top of everything else that is underneath, to keep more moisture in the bag.

Here at the Kenosha Potato Project we do not irrigate; we do not water the bags, so we are really dependent on the rain. And hopefully it will rain enough through the summer to provide for a nice crop. The home gardener may want to water the bags and increase the moisture because that is what increases the yield at the end of the day.

The factors that mostly effect the yield of potatoes are two. Temperature – we talked about the temperature. We want to keep the temperature of the bags as low as possible, and obviously black bags are likely to be warmer than red or tan, therefore we believe that the yields are going to be higher in poppy orange or tan versus black.

And the second factor that is essential in growing potatoes is moisture retention, therefore we are testing different bags with different combinations of ingredients that we put in the compost to retain more moisture.

[6:25 minutes into the video]

Angela: So we go through here once a week and look for new growth, if there's any weeds. This has been great. So far we haven't had any weeds at all.

The wood chips have done a nice job of keeping the weeds away and down. And we've had some nice [just] potato growth, which is terrific.

July 31, 2012

[Dramatic background music. Captions on the video, per the National Weather Service, reads as follows:]

The research quickly feel victim to the North American Drought of 2012. Rainfall for the month of July was only 3.88 inches.

The drought has inflicted, and is expected to continue to inflict catastrophic economic ramifications for the affected states, so far costing more than \$35 billion in the Midwest. As for the whole US, the drought is predicted to reduce the gross domestic product by 0.5-1%, equating to a loss of \$75 to \$150 billion.

It has exceeded, in most measures, the 1988-1989 North American drought, the most recent comparable drought, and is on track to exceed that drought as the costliest natural disaster in US history.

Curzio: This potato that you see here is about knee high. The variety's called Papa Chonca. It's a perennial potato and has been grown here in my garden for the last 3, 4 years. It keeps surviving the winter. I tried to get it but I really can't find them all when I harvest, so there are always more potatoes in the ground and they keep growing. It's great to have something that you can compare to, that grows naturally like that. And it showed how the potato's supposed to grow naturally if it's left in this environment, in this soil.

I have the same potato growing in a bag, and I've grown it in a bag last year. At the end of the season I put the bag in the ground and I left it over winter. So this is a bag [that] has grown by itself, has germinated, has emerged naturally. And you see it's about knee high, about the same height. I am very curious; I'm almost impatient to harvest this bag, because I really would like to see what a bag will produce in a two-year cycle, because this was planted a year ago.

If you came last year and took a picture of these bags, you would have seen all green, because each bag had about this tall growth everywhere.

We live with what nature brings us. We have no control over nature. But some are really nice for what we have, for the conditions that nature has given us. Very healthy.

Jeff: The bags have only got...

Curzio: The bags that I put against the building here, I really put a lot of hope in them because, as you can see, the roof of the building is slanted and there is no gutter. So basically all the rain that falls on the surface of the building is going to fall into the bags that are immediately underneath. Well, there was no rain, but still [*walks toward the building*]... So this potato emerged at the end of July. This is the result of the last couple of inches of rain that we had in July, because in June when I planted nothing grew out of these bags. This is a landrace potato called Frutilla, usually makes very, very tiny red tubers.

Another nice potato, Elmer's Blue. Wonderful. This is the potato that the USDA would like me to taste. Actually this is a seed that I received from the USDA. Wonderful growth. Very healthy vines. Flower buds are developing. We can also look at the size of the stems; that kind of gives us an opportunity to rate the vigor of the plant. Do you see the blooms?

It's kind of interesting that these varieties that are landraces, like Cruza, Elmer's Blue, these are tubers that don't look like the potatoes you will find in grocery stores. You know, they look more like fingerlings. They have deep eyes. They have strange shapes. And landraces are potatoes that have not been bred by a potato breeder. These are varieties that have grown in South America for centuries. And one of the features of the potato as a crop for humans is that they will survive drought.

Blue Shetland – this is a potato from Scotland. Also has blooms in August. Pretty amazing.

This here is a German potato, Birgitta.

And this is a potato from the UK, Arran Victory, that has died back completely, and now is re-emerging. So the potato is not dead.

Mac Black, Midnight Beauty. So this is also another landrace. This potato is called Ozette, grown in America for some 300, 400 years in North America because the Spanish discoverers on the, you know, Voyages of Discovery took this potato from Latin America up to Washington State, where they traded with native Americans.

In each bag I put six tubers to start, so this bag is an example of how the different tubers have emerged. One has developed a decent vine; the other, not really so much.

Jeff: Most of this growth has happened since the last couple of weeks?

Curzio: Most of the growth, yes, mm-hmm, because without rain the vines have been sitting.

This is another vine that has flowers. Up-To-Date, another British variety.

[15:00 minutes into the video. Caption:] *The draught continues. Rainfall for Kenosha, month of August: less than 2.5"*

August 31, 2012

So growing with potatoes in bags, the bottom line here is that you need to keep watering. I don't have water here, so I can't really optimize the harvest because of the lack of water. But that's the silver lining of my story is that this year with the severe drought that we had in the Midwest, in Kenosha we only had maybe 3" of rain from May to August. With this little rain still we have – as you can see, look at these vines. They look great. They have flowers on. I'm sure I'm going to be harvesting out of these bags. And the difference between these bags and some of these bags is just the strength of the seed.

So let's go harvest, because really what we are interested in is to see what we can get out of a total bags that has maybe a different medium, different composition of ground in the bag.

I always start with this, with an empty wheelbarrow because I want to be able to go through the dirt and see what's...

So here we have 15 bags that I have been growing with Gardener's Supply medium. So you can see that these vines are starting to die back, compared to these that have still some vigor and vitality. I'm thinking that these vines still have some strength that is going to transfer into the tubers. But just for the sake of this shoot, let's harvest this Rosa.

When you grow 300 varieties of potatoes, if you're not Swiss, like I am, you know, which is a little bit anal retentive, and precision, soon enough you don't know what you have any more. So Rosa [*makes notes on a bag on his clipboard...*]

Next step, I'm going to remove the tag. And the tag goes in the paper bag for next year. So you have a good shot here?

Jeff: Yep.

Curzio: So obviously we have – actually let's cut these vines away so they're not in the way. Lots of energy here that would have gone into the tubers if I let them dry out, and that's what I usually do; I let the vine dry completely. All this energy goes back into the tuber.

Now what you see on the very top of the bag is wood chips. The wood chip has worked great. It has kept the sprouting of the seed in the straw to a minimum. You see, I have no weeds in this bag.

So this year, this was my first year experimenting with this composition of the bags. I have compost in the very bottom, and I have straw on top. Now this straw that I put on top of the compost, it's what I call a shading medium. It's really designed to keep shade on the tubers, but it's also a barrier that potato vines have a hard time growing through. If the vines don't have vigor, they will not grow through.

So here you see the vines growing, that have grown through the what I call the shading medium. Now we can put the bag in [the wheelbarrow].

At this point I like to analyze how far up the vine sets tubers. As we go through the dirt, we will find tubers attached to the stolons.

This is the seed piece that I planted, so this obviously is good for nothing; it needs to be removed because this would spoil. You see, this piece has rotted completely. This seed piece also needs to be removed.

Obviously this would be quite a disappointing harvest for a grower, but these are wonderful mini tubers to use for seed next year. Really wonderful quality of the skin; look at that!

Jeff: Now these will keep until next year?

Curzio: Absolutely, yes. And these are what I call micro-tubers. Well, this is borderline between mini – but these are definitely micro-tubers. So as part of all my record keeping, I want to know how many mini- and micro-tubers the vine has developed. So if I left these vines to completely die off, maybe these tiny micro-tubers would have developed into something useable. This is a micro.

At this point I just reverse the whole bag inside my wheelbarrow, and now I can go through this and check. So this is the growing medium that Gardners.com has provided. And mixed in here we have some compost.

Well, we are going to be comparing to another bag. That vine clearly shows nothing has grown out of this seed piece. Why? Well, possibly lack of moisture. There is very little moisture in here, very little moisture because of the severe drought. But still we were able to produce some tubers that will be used for the next growing season, and hopefully next year we are going to have better luck with the season.

So we are done with the Rosa and I can count in this bag. Can you look; can you see this bag? So there are one, two, three, four, five, six mini-tubers, and about four micro-tubers. Rosa: six mini- and six micro. [*Writes notes on clipboard.*]

And when I get in the house I'm going to weigh the crop and compare to last year. I'm sure the harvest last year was much higher.

And these bags get put away for next year.

This is a different variety. This is White Rose. So you're going to see this is going to be very different looking. A decent crop. I get quite a few requests for this variety: White Rose or Wisconsin Pride.

This is hardwood, ground hardwood. You know the company that makes the parquet for basketball courts? There is a company in town; it's called Dejnors. They are on Green Bay Road.

Jeff: OK.

Curzio: And they sell bags of wood chips for animal bedding, and they get me these wood chips. And they have different quality of wood, and for my purpose they get me the best quality, which is, you know, [what] comes from the factory that makes sports hall parquet.

OK, so when I start planting I put six tubers in the bag: one in the middle, and five around. And one of the shortcomings of growing in bags is that often you lack moisture around [the edge of the bag]. As you can see, the one in the middle has developed a nice vine, while around, probably not, because the bag was probably too dry.

So when I harvest, I always hope that in the straw I will find some spuds, and so far not. Oh, here they are. So using straw for planting, one benefit is that the straw keeps the spud nice and clean.

But this is a variety that has a potential to grow spuds like that, you know, so these are really tiny ones, which for the purpose – for my purpose, to use as seed they are fine.

Let's go back into the wheelbarrow. See, these were mini- Look, this is a seed piece, so rotted. Obviously harvesting a couple of bags will not give us any...

Jeff: They are really clean.

Curzio: You know, the home gardener that harvests these many potatoes, that's not even enough for a meal. You know, it's kind of depressing.

Jeff: Yeah, after all season.

Curzio: Yeah. Next year I will probably have at least 20 or 40 bags close to the house and I'll water them, so that I, you know, have some comparison.

Oh, this is coir. This is a fiber; it's a coconut fiber that we mixed in this bag to increase the moisture levels.

So I'm going through this bag [soil mix]... with a fine comb, right? That's it. That's the harvest. Three mini, four micro; three mini, five micro.

Well, I have harvested bags with nothing, with no growth and I still found a couple of tubers inside, mini-tubers. But that's really all that I want to have, you know, so I have something to plant next year.

And I am very happy, very happy with these bags. But someone that is using these to grow food for their family, they need to understand how to do it so that they get a decent crop.

[31:33 minutes into the video]

October 18, 2012

Curzio: Today's October 18th, and we are kind of wrapping up our potato project for the season. I am far from being wrapped up. I still have 90 bags to harvest. And what we're going to show you today is another aspect of my

research. I am also looking for potato varieties that can take some light frost. So if I see potatoes that are still growing a little bit of green, and we already had a few patches of frost instances, but we are very close to the lake [Lake Michigan], so the temperatures are usually up to 10 degrees warmer than ten miles farther west from here. But anyway, the little frost that we had already kind of killed almost all vines, but I still keep an eye out.

And one of the vines that I hoped you were able to shoot – unfortunately you were not able to come back – I had flowers on vines a couple of weeks ago still, and lots of berries. And perhaps that's what I want to show you now.

These are, this variety is called a Dheera, and it has produced a lot of berries. And this is going to be interesting for people to see because most people have never seen potato fruit. They look like tomatoes, and they contain what we call botanical seed. And I'm going to just split one open for you.

Let me see. In the long version of our documentary, perhaps that's another very interesting thing. You know, people don't know what to do with these. Well, you can keep them for many months, and sometimes through the whole winter. Just monitor them. You don't want them to get dry, nor too soft. When they get a little bit riper – to the touch, you know, they are a little softer – perhaps I'm going to just feel a few of these. Some are a little harder. I think this one that I have in my hand is a little softer.

And you just cut it. If you have a lot of these, you know, you would put them in a blender and just blend them to divide them up. And then you cleanse the seed like you would do with tomatoes. And perhaps you can see the seed right here. This is seed. This is what we call TPS, or True Potato Seed, or botanical seed. They are tiny, you know.

You may want to wash them, and then we want to dry them, and then you can freeze them – put them in a Ziploc bag. And they keep for years, maybe ten years. You can start a vine using this botanical seed, and you will have to baby the vine like you do with tomatoes in the spring, and then put it outside.

Often it [the botanical seed] will develop into a regular plant. It may not produce very large tubers. It may only produce one micro-tuber. So that's the worst that I've seen, a tiny, tiny potato that has grown from this vine, but that tuber will be used the following year to start a vine like you do

normally with seed potatoes. And you will have to do that for several years until you figure out if that is a variety that you want to keep propagating.

So that's it. Let's move into the garden and let's see if we can find a bag that has produced a nice crop this year.

So this morning we are going to only harvest a couple of bags just to show you – hopefully I will be able to find a couple of bags that have produced well.

I just received a Facebook message from one of the members of the Kenosha Potato Project group, on Facebook, and she posted that she was able to harvest 60 pounds of potatoes out of a 4' x 5' bed, which is very good. So I invite anybody that is a fan of growing potatoes to find my Facebook page: Kenosha Potato Project.

So as I mentioned before, one of the topics of my research is to find potato varieties that will take a little bit of light frost. And we are late in the season, and obviously I am kind of delaying harvesting some potatoes because I just want to see how far into the winter they will survive.

This is a variety – you can see there is one bag standing alone here, and this variety is called Lauterbrunnen – it is a variety from Switzerland – and still has some nice green leaves that have not been affected by the frost, while, as you can see, most of the leaves have died off.

This variety is called Up-To-Date, and you can see its leaves are still nice and green.

Obviously when the vines are still green they are still providing energy to the tubers. Eventually they may grow a little larger; maybe not. Nobody really knows when the bulking stops. But if the vines are alive, I'm going to let them die naturally.

A few bags over here, in my opinion, have suffered less from the drought, and have produced very vigorously. Look at this one, how much green this one still has. Oh, this is the Dheera variety that has the berries. You can see there are more berries that I missed harvesting right here.

Perhaps we're going to harvest this bag here. This is a bag that had some nice growth. Let me see. Ah, these are small potatoes.

OK, let's see this one. So something that I learned this year is that using straw is not a good idea. Harvesting potatoes off straw in the bags is very difficult.

So while I harvest, my interest is to see if I can find tubers higher. So maybe you can kind of zoom in here? Can you?

[40:00 minutes into the video]

Jeff: Yes, I'm in there.

Curzio: So now I kind of ripped out a vine, and you can see the tubers attached to them. But what I care is to analyze as I'm going in here; I want to see if I can find tubers higher in the vine. And as you can see on this variety, I don't see any. The tubers are lower.

So this, you clearly recognize that this is all – that's the seed piece. Obviously this part we want to discard because this is good for nothing. You can tell what is the new potato and which one is the seed part. The seed part will not over-winter.

Jeff: The wind's picked up.

Curzio: Yep. So obviously as part of the research we need to keep records of everything that we do. This variety's name is Michoacan. And we have a label right here, so we'll remove the label. I don't have a tool; I will remove the label later.

But what we need to keep track of is we want to see how high up the vine the potato sets. And it is my contention that if we grow potatoes vertically rather than over a large space, but vertically we want tubers at different levels up the stems. That will increase the yields. And when I harvest, this size of potato is what I call a mini-tuber. So this is the size of a chestnut, to the size of a small peach, would be a mini-tuber. And this is what I rate a micro-tuber, and it can be as small as this, or as small as this.

So now you see tubers were set here. One tiny tuber developed up here. More tubers could have developed further up the vine, and obviously different varieties will develop tubers at different levels.

The temperature, the high temperatures that we had this summer, the drought that we experienced this year may have influenced the harvest.

So here you go. This part here is a stolon. The stolon is the part that connects the tuber to the vine. How long is the stolon? Some stolons are very short; some are longer. The longer the stolons, I believe, the more you have a chance for the potato to develop inside the bag.

So I'm looking for longer stolons. So these are all nice mini-tubers. This is the perfect size to plant next year whole. Larger tubers will have to be cut, but when you cut a tuber, you kind of lose energy, especially with growing in bags because the bags get dehydrated more. I noticed that tubers developed more in the middle than the outside because outside the [seed piece] tubers get too dry. So if you plant tubers [seed pieces] out here, chances are that they don't develop well.

So here you see the skin of the tuber that was planted originally.

In the wind, the bags fly.

This is another mini-tuber, and this is a micro-tuber.

So also it's important to keep in mind that I do not irrigate. I do not water. And for the lack of water, obviously the yield is much lower. Imagine if I had this bag close to my house and I was watering, this micro-tuber may have developed into a large tuber. That will obviously change the yield.

So this large tuber here is clearly a seed piece, so we don't want to mix the new crop with the old crop because this has a chance to over-winter, while this has not.

In doubt, if you don't know if this is a seed piece or not, you just put pressure on it, and often tubers that are older will just split apart. Well, this one doesn't this easily, but you can tell from – I'll just show you. Usually you will be able to do what I'm doing here with, you know, with your fingers – split apart a potato; it's not that simple. But this is a year old, so you can split it apart. If I had a tool it would be easier.

When you split a seed piece apart, you can tell it's soft. This is nothing that would survive the winter so it's good for nothing.

So after I harvest every bag like I'm showing now, I kind of analyze. That's another tuber that has survived. Perhaps now I can make another point, that is by planting the whole tuber, by not cutting it, you see, it's survives. And this is the battery that gives energy to the vine in periods of drought. So obviously farmers will make two seed pieces out of a potato of this

size; they will just cut it in half. But once you cut it in half, you lose some power.

So after having pulled what I found on the surface, I will turn the bag around and now – OK, all of this goes to the chickens. And now I can go through... Well, I found them all. Sometimes when I do this I find more. And now I have – this is the crop. You can see how much I harvested. I guess this is about a pound of potatoes, which is very little for a bag. I have harvested up to 3, 4 pounds. Some people have harvested 10 pounds off of a bag. But you need to water in order to get those larger crops.

[50:30 minutes into the video]

So I have 90 more bags to harvest, and you can see, it's not very fast, my job, because I have to keep a record of what I'm doing.

Riverwood. This is a white tuber that also was developed by the USDA. Actually it was – this is a variety that was imported by the USDA without a name. It only had a code: PI60... Something [At the time of import to the USA the USDA attributes a code .. PI for Plant Introduction ... this one is PI607501]. And Mike Toboyek from Riverwood Farms here, next door, was growing it, so we decided to rename the code of the potato with his farm name. That's why we call it Riverwood.

So let me see if we can see a little better what we are doing. As I'm pulling the straw out – See, this is interesting. I put wood chips on top of the straw, and you can see the vines have developed roots into the wood chips, but they have not developed roots into the straw.

And here is a tuber that is clearly much higher than the soil that is down here, you see? This is exactly what I like to see. So this variety is a variety that develops tubers higher, so it has, in my opinion, greater potential to develop a higher yield – Riverwood [*writes notes on bag*].

So that's what I do. Next I remove the tag from the bag because I recycle these tags. Better yet I reuse them, so I know what variety has been grown in this [potato] bag. It goes in the [paper] bag. And I also make a note on the bag right away because otherwise I will forget that the variety sets tuber high.

So next year, instead of growing this variety in a 14" bag, I will grow it in an 18" bag. This bag is 4" taller, and obviously you want to use taller bags

for varieties that you know are setting higher. If the variety does not set high, why waste the time, you know, to grow it in a...

This is a wonderful mini-tuber, perfect for planting next year. Actually going to move over here so I can keep my straw...

Next year I'm not going to use straw anymore. This is too complicated. Too much work for what I'm doing. But it's cheap; that is for sure true that using straw instead of compost, it's cheaper to fill the bags. But if I fill the bags completely with compost, I would probably get a bigger yield. So next year I'm going to just use compost and no straw.

Here are more tubers: mini, micro. And sometimes I will find a tuber that is – so this, you can clearly see these are the seed pieces.

So you can see by harvesting a bag inside a wheelbarrow, nothing escapes. Everything is found.

The yield of this bag is very depressing; only six tubers. So this would be three minis and three micros. But that's the year, you know. No rain. One could be very disappointed after, you know – I have two bags in my hand and one is a pound, and one is probably not even two ounces. You put so much work into planting a bag and you only get two ounces at the end of the season instead of six pounds, which you could get. And I'm not depressed at all. I'm very happy because what one discovers is that some varieties can take the drought, can take the heat, and that's very promising to find varieties that will grow under harsh conditions.

And as a gardener, obviously you can tend to them more than I would. I leave them very much to the elements. That's part of my research. And every year I learn something, so this year what I learned is that using straw makes harvesting very, very difficult, and I'm not going to do it next year. Next year I'm going to fill the whole bag with compost.

I am also going to do, to have bags closer to the house next year and water them – maybe only 30 bags out of the 300 that I have, so 10% of the collection will be grown with water just to see if the yields increase a lot, which I think they will.

And in closing, I would like to say that I like to correspond with anybody that is interested in this project. And if you are a Facebook user, find the Kenosha Potato Project on Facebook and post your comments. If you're not a Facebook user, you're welcome to write to me. My address is 403 Eighth Street, Kenosha, Wisconsin 53140. You can address your mail to

the Kenosha Potato Project at the address that I just mentioned and I will respond to you.

Thank you very much for the opportunity, Jeff, that you have recorded and documented, and perhaps next year we'll add another chapter and see if there is something interesting to discover.

[Video captions:]

Producer/Editor/Camera/Graphics/Phantom Voice Jeff Baas

Special thanks: Angela Cassity, Dejnors' Inc., Father Dom's Compost, Gardeners.com, Kenosha HarborMarket.

Production donated by: JBCS Group.

Transcript donated by: Barbara Leable, Collabra LLC