THE REGULAR, AND NOT SO REGULAR, NEWSLETTER OF THE GARLIC SEED FOUNDATION

The Garlic Press

Mid-Spring 2008

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#46

CONTENTS

A collection of articles from the past ten years of garlic publications from Ontario, Canada.

Initial membership in the GSF is $15/4 issues. Renewals are 8 issues for $20. All submissions for ***The Garlic Press*** *should be sent to GSF, Rose, NY 14542-0149 or rjdunkel@yahoo.com.*

Stealing With Both Hands!

They say that to pirate and use someone else's work is the greatest form of flattery. Although Homeland Security warns us of the wily Canadians as ice-skating, fur-trapping, beer-drinkers trying to invade our shoreline, those of us living on the northern border know our neighbors as hard-working, intelligent, creative beer-drinkers! One such neighbor is my friend Paul Pospisil, a lanky fellow with a warm, infectious smile, study handshake, and genuine kind words—a grower of garlic, preaching the garlic gospel, promoting and education at every level—a kindred spirit. I've had the opportunity to spend time with Paul and his wonderful partner and wife, Mary Lou, at conferences and festivals and I could feel their very positive and productive energy, like putting it down on paper....

Paul began writing in 1997 with the 2-page *Any Home Gardener can Grow Great Garlic* (after 5 years of trials and experiments) and has handed out 10,000 copies. He was a charter member of the Garlic Growers of Eastern Ontario and edited their newsletter, *The Voice of Garlic*, until 1999. With the demise of the GGEO, in 2002 he put together the *Garlic Newsletter*, which has evolved into *The Garlic News*. From the very beginning, Paul and I have exchanged newsletters, information, recipes, bad jokes and research. He has had access to everything in the *Press* and he has offered his publication to the GSF. You are holding it—years of Paul's efforts. Unabashedly, he supports organic practices, quality product, local consumption, the small farmers of Ontario and the enjoyment of a little garlic with his supper.

You'll find some information that you weren't familiar with: the leek moth, a European import has been in Quebec for a while and came into eastern Ontario 15 years ago but is not yet a "real serious" pest. It's also been recognized in the USA by the USDA (and will be covered in *Press #47* (March, 2010!). Canada has tried to initiate a sizing/grading system (the USDA proposed this in the 1940s) but it has never caught on. It's all good. *The Garlic News* has been able to use subscribers' letters as an important information source, something we and the *Press* have never been able to do (we beg, grovel for help). Unless otherwise noted, the articles are written by Paul, who told me, "I'm not looking for more subscribers, but if they're serious bulbheads, I'll put them on the list" (see page 30). Paul and Mary Lou are into some rough times this Spring, and I ask you please keep them in your hearts and prayers as you enjoy this special *Press.*

So welcome back! GSF has been busy! We got a new name: Friends of Garlic, Incorporated, and recognized as a not-for-profit public educational 501(c)(3) in the eyes of the IRS. We got a Board of Directors, USPS cheap rates, bank account, EIN and a NYS Tax number. We have restocked all the mail order items (except T-shirts) and answered all the letters (Khurshed Bhumgara has spent many hours putting together the cookbook and now he's looking for a printer. We are into the last year of our SARE grant and I refer everyone to bignewsforgarlic.com as new photos and data will soon appear. We're going to be coming back at you real soon with ***Press #47*** in late Spring '08. We don't enjoy getting behind anymore than you do, and just like growing the garlic, we'll always try to do better. So here's a *Press* that will keep you busy into Spring and we thank Paul and all the contributors to *The Garlic News*, like Orville Herrington from L&O Farms in Cawston, British Columbia, who advises: "If you're going to farm garlic, don't get any bigger than your wife can handle!"

— Bob Dunkel and David Stern

THE GARLIC NEWS

Connecting the Canadian Garlic Network!

Ted Meseyton, The Singing Gardener & Garden Poet

One of my most recent compositions is a song titled: "**I'm A Garlic Guru**," and the lyrics follow below. I was inspired to write it by Paul Pospisil, Managing Editor of *Garlic News* and I dedicate it to him. If you've concluded that many of my songs have other garden themes, you're right!

Refrain

I'm a garlic guru, I'm a garlic guru,
I'm a garlic guru and how do you do,
And I grow garlic organic too.
I'm a garlic guru, I'm a garlic guru,
I'm a garlic guru and how about you,
Aren't you proud to grow garlic too?

1. I'm a garlic guru, cook with garlic too,
   Smell and taste is what it's about,
   It's garlic for me, I need no recipe,
   To tell me that garlic has clout.

2. Garlic what a friend, faithful to the end,
   To the top of my lungs I will shout,
   Of garlic I'm proud, so I say it loud,
   Grow some garlic, year in and year out.
   (Repeat refrain).

3. I am convinced, garlic's a prince,
   A principal health food no-doubt,
   Kills viruses, germs, makes infection squirm,
   For the more I eat, the more I yearn.

4. From my breath to my toes, with me garlic goes,
   Don't care if the whole world knows,
   I live and breathe, garlic's my creed,
   There's happy folks where garlic grows.
   (Repeat refrain).

5. Now you know I'm a garlic guru,
   And quite a few of us there are too,
   I garden organic, results are titanic,
   How well everything grows.

6. Oh how well my garlic grows,
   Oh how well my garlic grows,
   No need to panic, when you garden organic,
   Spread the word, let people know.
   (Repeat refrain).

Curing Your Garlic

(After a Wet Year)

If you're like many growers across the Eastern Ontario region, you've probably experienced some concerns about your garlic crop this year. A late spring, wet summer and lack of sunshine have delayed the harvest and had a detrimental effect on garlic. What that means is smaller bulbs and in some cases, fusarium virus causing the roots to decay, reducing your crop. There's not much you can do about it as that's the way nature works.

On top of that, we're experiencing one of the dampest summers and highest humidity during the harvest period in many years. Night humidity has been running at 100% for much of July and early August.

That spells trouble. Garlic will mould rather than cure when the humidity is too high. If it does, you lose your garlic. It's even worse than summer 2003, when some growers lost much of their crop to mould and decay after it was out of the ground.

May I share some ideas with you on how we, at Beaver Pond Estates are coping with the curing problem this year?

1. Our outdoor drying shed. We've added extra fans to keep the air moving. At night, we close it off with tarpaulins to cut down on the amount of dampness that comes in. That helps tremendously. The tarps stay on until the morning sun burns off some of the dew and then we open it up to the sun and breeze. Fans run 24 hours per day.

2. Moving garlic indoors: Being very small, around 5000 plants, we can move some of the harvested garlic indoors into the porch and back room to speed up drying. We invested in some portable dehumidifiers last year and they run constantly until the tanks fill up with water. They need emptying twice a day.

The garlic dries very well, but it costs more in electricity and heats up the rooms. However, it works and dries the garlic much faster than just air drying. We didn't lose any garlic to mould last year and hope not to this year.

If you're lucky enough to have built a full drying facility, you won't have these problems. We're not big enough to afford one, so have to cope as best possible.

If anyone has any other ideas, please pass them on.

The Garlic Exchange
The Story of Music Garlic

Most growers and as many consumers have heard of "Music" garlic. It is the McDonald's hamburger of the garlic world.

Why should this one strain of garlic, out of hundreds, be so well known?

When I was preparing the guest lecturer lists for the 3rd Glorious Garlic Festival (Perth Garlic Festival) in 1999, 1 invited Al Music to come to Perth and talk about his special brand of garlic to the Eastern Ontario garlic fans.

Al is the grower who developed this strain and gave his name to it. His business card states, CANADA'S OWN GARLIC KING.

Since he was delivering a truckload of garlic to Montreal, he stopped over for the Perth festival.

His talk was appropriately entitled, "The Story of Music Garlic."

Al's tale starts in tobacco country of SW Ontario in the early 1980s. He related it in a very unassuming manner, from a grower's point of view. The tobacco fields in the region were losing profitability and alternative crops were needed. Many growers where changing over from tobacco to herb production.

Al had been trying out garlic, with its rising popularity in North America. He had developed one garlic, of a Continental variety (now called Porcelain) which grew well in his soil and climate.

Capital investment was minimal as the tobacco sheds and field equipment were adaptable to garlic production.

Al's hardneck garlic had many advantages. The large cloves were easy to peel; it had strong garlic flavour and bite (heat, in garlic parlance); it was easy to grow and produced large bulbs with huge cloves; and, restaurant chefs could handle it with ease.

In appearance, it differed significantly from the imported softneck garlic which was flooding supermarket shelves, making it easily marketable as a distinct product.

Al and 12 other like-minded growers banded together for the purpose of growing and marketing this strain as a standardized garlic type, forming the Ontario Garlic Growers Association (OGGA) in 1985 for this purpose.

They named the garlic, "Music" in recognition of Al's initiative.

Later, planting stock was made available to other new growers in order to increase garlic acreage. As production increased, Music garlic started to appear on supermarket shelves, providing a tasty alternative to the imports. Through effective marketing, it was presented as "Ontario Garlic."

The catchy name "Music" caught on, writing another chapter in Canada's agricultural history. Music garlic is here to stay.

Here is what I learned about growing garlic the first time out:

By Steven Reynolds

1. Hook up with someone who knows how to grow garlic. It is a big bonus if you talk to a grower at garlic festivals or just someone you can call when you're not sure what's going on.

2. Search the Web for articles about growing garlic and pictures of the plant showing signs of disease. Information at garlic festivals can be very helpful.

3. Select an area in your backyard or the "back forty" that has good soil and drainage suitable for your beds.

4. Think about where you're going to get your water for those days and weeks when Mother Nature is on a hiatus. Tap into the rainwater from your house downspouts, buy a large water tank or trough. If you live in the country, well water is too cold for the plants and you need a lot of it.

5. Buy your seed stock early from a local organic grower.

6. Buy your straw for covering your seed beds right after Labour Day - it's cheaper then and still available. Your back will appreciate it next spring and summer when you don't have as much weeding to do.

7. Locate a good source of sheep manure or other fertilizer as early as possible if you're planting lots of garlic.

8. Prepare your beds and till and till until you can't till anymore. Add organic soil amendments. I plant in raised beds but you don't have to.

9. Round up family and friends ahead of time for thanksgiving weekend planting. Why not? They will likely be the lucky recipients of a bulb or two. Make it a fun thing ("cause it really is fun').

10. Enjoy your winter while your garlic is resting.

11. Check your garlic in February or March and add mulch if needed.

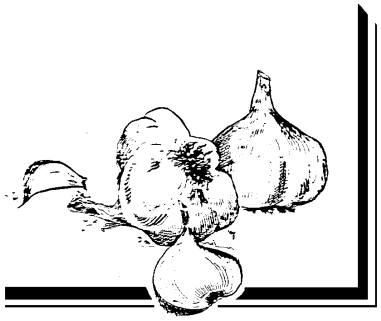
12. Weed weekly beginning in the Spring.

13. Snap those garlic "scapes" in June.

14. Pull those plants in July and August.

15. Wash 'em and hang 'em high partner!

16. Look at those lovely bulbs and pat yourself on the back for a job well done, and, yes give some credit to Mother Nature and, of course, to the wondrous garlic, one of Earth's incredible plants!



Research Summary of Garlic Trials at Ridgetown College, University of Guelph

by John Zandstra

We have been involved in production management of garlic for the past 6 years at Ridgetown College, and have worked with a number of issues, which include seed quality, seed orientation, the relationship between seed size and clove size, use of mulch over the winter, effects of leaf removal at scaping (in response to mechanical scape removal), the impact of in-row and row spacings on garlic yields, and the proper timing of scape removal to prevent decreases in yield. Presently we are beginning work on nitrogen management, effect of planting date on garlic yields and irrigation timing. All of our work is done with the Music strain of garlic. Some highlights of previous work include the following:

a. subtle damage to seed can impact yields; we evaluated seed from bulbs which had been heated too much while being cured and had turned slightly brown and could not be marketed. While growth and vigor appeared similar to plants from undamaged seed, yields were reduced because of reduced plant numbers, which we assumed was from slightly poorer emergence in the spring.

b. while in-row spacings of 4" appear to be best for Music garlic, decreasing row widths can dramatically increase yields. We examined row spacing from 65cm down to 15cm, and while modest decreases in bulb size were noted, large increases in yield were found. For example, decreasing row width from 64 to 45cm decreased bulb size by 10% but increased yields by 35%.

c. leaf removal at the tune of scaping has negative effects on yield. We removed several leaves at scaping to simulate mechanical scape removal, but often yields were reduced if only I leaf was removed.

Presently we are beginning work with nitrogen management in garlic, from both

production as well as environmental impact perspectives. Various rates and timings of nitrogen are being compared in order to document the yield response of garlic as well as to document soil levels of nitrogen to see if significant amounts are being lost. Initial results suggest that garlic responds to early application of nitrogen, as is presently recommended in Ontario, and may even benefit from applying proportionally more early in the season.

We have also begun looking at planting date in response to what we see as a tendency for producers to plant earlier in the fall. In our 2002/2003 trials we found that early planted garlic (late September, early October) did not yield as well as garlic planted in late October and early November. This may be due in part to the harsh winter we had which destroyed most of the above ground growth in these plots.

One area we are particularly interested in is to see if there are any relationships between production practices and the levels of nutraceuticals (namely allicin) in garlic. While we hope to do more of this type of work in the future, funding is presently an issue.

Most of our research reports can be viewed on the Ridgetown College website, www.ridgetownc.on.ca

About Olive Oil

Olive oil enhances and adds to the flavour of garlic. It is healthy, being cholesterol-free and low in saturated fats. By itself, virgin olive oil is tasty and makes fine dips and dressings.

Greece, Italy and Spain are the main olive oil producing countries. Greece claims the highest percentage of "extra virgin" from its olive groves and by inference, the best olive oil. The Italians, of course, will challenge that claim. As a gourmet, you must try for yourself and make your own taste test. All produce both excellent and poor oils and all have different grading systems. The following is a good guide to follow when deciding what to buy.

The first two pressings of the olives give you the best olive oil. These are generally sold as:

1) Extra Virgin, the best and most expensive grade. Cold pressed from ripe green olives, usually green to amber in colour, low acid and full of nutrition. Use this grade for dipping sauces, salad dressings, antipasti, fish, etc., but not for frying. It's too expensive!

2) Virgin comes from the second pressing of the olives. Slightly higher in oleic acid but still an excellent flavour for table use.

   The next extractions are done using heat or are refined. Sometimes, virgin olive oil is blended to improve the taste. "Pure" comes from the third pressing under heat and the oil is good for cooking or flying.

   The lowest grades are called "pomace," "olive oil cake" or similar names and are not worth trying.

Keep a small quantity of top grade "extra virgin" on hand for table use. It has a shelf life so don't buy too much at any one time. For cooking, a good quality, refined or heat extracted olive oil is suitable, as there is little point in destroying the nutritional value of extra virgin in the heat of a frying pan! Whatever you do, choose olive oil, even in preference to butter, when cooking with garlic.

Aide-memoire: Mechanized Garlic Production

Garlic, especially the hardneck variety, is a fragile crop. The bulbs and the seed cloves are both easily damaged by rough handling, resulting in decay.

Exercise caution. Don't rush out to buy farm equipment without considering the risks to quality from poor machines. Growers looking to mechanize for increased production should follow this simple rule of thumb:

"Machines for the soil, your hands for the bulbs."

These Tasks Are Suitable for Mechanization.

Soil preparation: cultivation, tilling, fallowing, weed destruction, compost & compost application, growing green manures, adding organic soil conditioners.

Planting: making raised beds, making trenches or holes for planting, covering over planted beds.

Mulching: aerating and spreading straw.

Irrigation: laying hoses, applying water.

Harvest: undercutting of roots (proper cutter needed) Curing: air flow and temperature control.

Tasks Best Done Manually

Planting: cracking bulbs into cloves, inspection of seed, sorting and separation, laying out of rows, transport to planting area, planting cloves (also see below). Winter inspection: any remedial action needed. Spring care: inspection, pulling back of mulch. Growing period: regular inspection (ideally daily, no less than twice weekly), hand-pulling weeds that emerge through mulch, destroying insects (leek moth regions) or insect control (other areas), foliar or added fertilization if needed.

Scaping: in order to harvest crop of scapes for market. Harvest: inspection & determination of maturity, lifting of plants, transport, cleaning, washing and inspection, cutting of roots, grading by size, transport to curing facility.

Curing: regular inspection and control.

Market Preparation: Removal from curing facility, transport, removal of tops, grading and separation, packaging (never in onion bags, boxes preferred!), braiding or otherwise packaging for market.

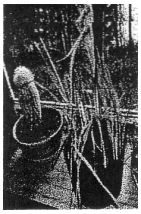
Tasks Mechanizable With the Proper Equipment

Planting: The time saving of these is rather minor compared to other high labour costs, especially those at harvest time. If you use a planter, get one that won't damage the cloves and also adjusts for different clove sizes.

Undercutting: Raised beds using the double 40 system enable undercutting with a blade attached to the tractor drawbar. It loosens the soil enabling easier lifting of plants.

What constitutes a living wage depends on whether you are paying it or getting it.

Windowsill Garlic



It's easy to enjoy the fresh taste of garlic all winter if you have a sunny window. Just grow a pot of garlic greens. They have the full flavour of garlic, plus, they are fresh and tasty at a time when it's hard to buy decent garlic. Take any windowsill container such as a flowerpot, fill it with regular soil, the same as you would use for indoor plants and plant your garlic cloves or bulbils. Push them about an inch into the soil and keep watered. In a few days, the garlic will be coming up. When the greens get about 8-10" tall, clip some off with scissors and use in place of regular garlic in your meals.

The greens have full garlic flavour. Just taste them. They will keep on growing giving several cuttings from each. Start a new pot every 3 or 4 weeks for a steady supply. We use the cloves from undersize bulbs — the culls — or even plant bulbils or rounds.

Don't expect to harvest any bulbs from your windowsill garlic. It's the greens that you're after.

If you still have some cloves left in the spring, grow some more greens in your garden. They'll tide you over until the new crop is ready.

The Garlic Song

Written and sung by New Zealand entertainers, Bill & Kath Worsfold at the 4th Annual Garlic Festival of Eastern Ontario held at the Carp Fairgrounds, Carp, Ontario, in August 2000. The song is performed to the beat of a "*doumbek*," a heavy walking pole festooned with loosely attached beer bottle caps, which rattle every time it strikes the ground. *Reprinted with permission.*

Bill & Kath also performed at our local Maberly Fair after the festival and sang the Garlic Song as a tribute to Mary Lou and I. It was quite an honour.

CHORUS: Garlic! Garlic! We love eating garlic! Garlic! Garlic! We love eating garlic!

1. The breakfast foods I love the most
   Are garlic jam on garlic toast,
   Garlic cream and coffee, too,
   With garlic sugar — one lump or two!
   CHORUS

2. I like garlic juice on garlic flakes
   With a cup of garlic tea,
   Chocolate-coated garlic cloves
   Are just the treat for me!
   CHORUS

3. Garlic's really good for you,
   It will make you fit and strong.
   It can cure every known disease
   It's a pity about the pong!

Sep Bonner's Sofa Leg Garlic Dibble

Have you ever dibbled your garlic? Well, here's your chance to make your very own "garlic dibble" using Sep Bonner's novel design. A dibble is a tool used for planting bulbs, or, for us, garlic cloves. I stopped in to see Sep Bonner on his farm near Athens and he showed me his invention, the Mark I version of his garlic planting tool, made from a few recycled sofa legs (those short, tapered things that screw into the bottom of your sofa) attached to a sturdy base of steel shelving corner with a handle attached. The idea is that you can make your planting easier by pushing tapered holes into the soil with the dibble, just the right depth, walking along the rows, and then you can just drop in the cloves, saving yourself the work of making trenches for planting. Saves the back, too.

I was impressed with Sep's invention. Since it wasn't yet patent-protected, I rushed home to make one myself.

An hour was spent rummaging through my lifetime collection of treasures to find eight reasonably matched sofa legs, saved many years ago for just such an occasion, a piece of 2 x 4 in which to mount them, and a suitable, broken shovel handle to attach to this contraption to make it look like a garden tool. The handle is also useful, being needed for manipulation of the device.

Another hour in the workshop assembling it, and "Eureka!" I had my own garlic dibble.

Sep and I use different planting techniques so I made mine 24" long, with staggered rows of sofa legs spaced at about 3 3/4" apart, enabling 4 cloves per foot of row.

I called mine a Mark II, due to its obvious enhancements! Sep's Mark I had the sofa legs arranged in a straight row so this engineering change to staggering the sofa legs was clearly a new design, worthy of its own patent!

The picture shows Sep and I comparing our two versions of "Sep's Sofa Leg Garlic Dibble," the Mark I straight row version and the highly re-engineered, staggered row, Mark II version.

Now, suitably armed, we impatiently await garlic planting time to test out these ingenious devices.

To build your own, collect up 6 to 8 recycled sofa legs, 5-6" long, a 2 x 4 about 24" long, a handle from a broken spade or shovel and some sturdy wire to brace the handle.

The legs have protruding threaded screws. Drill holes 1/8" smaller at desired spacing in the 2 x 4 and screw the sofa legs into the holes as tight as possible. Cut the handle square, attach with a long screw or lag to the 2 x 4 and brace it with diagonal wires attached from about a foot up the handle to each end of the 2 x 4.

Sep's design uses a bent pipe instead of a broken shovel handle. Both systems work. Use what you have on hand.

Testing the Garlic Dibble

Sep Bonner's Sofa Leg Garlic Dibble was used in planting the garlic trials plot this year. (see the Fall 2004 Issue for article on the Dibble).

The Trials Plot is planted in raised beds 50' long, 18" wide with 18" walkways between, planting two parallel rows per bed. Two basic planting densities are used, intensive at 116,000 plants per acre (equivalent) for short strains and normal, at 87,000 plants per acre for taller strains. In-row spacing is 4 plants/foot and 3 plants/foot respectively. Cloves are staggered or offset about 1" from the centre line giving actual plant spacing of 4" and 5".

I built two dibbles, one for each spacing density.

The beds had been well worked with compost tilled in a month before planting time. A final roto-tilling just before starting planting ensured the soil was easy to work.

A test run with the dibbles produced clean holes with just enough compaction so they didn't fill in before the cloves were dropped in. A very light pressure with the foot pushed it into the soil and with a little practice, the holes were near exactly the required 4" deep.

A 50-foot row took just a few minutes to make the holes and less than 10 minutes to drop in the cloves and cover them with a cultivator hoe.

We started our main planting with the full moon of October 28. Planting was enjoyable and a lot easier using this device than previous years when we made trenches and carefully placed the cloves in the bottom.

Things went well, too well, in fact. On October 30 as we were just half done planting, an all day downpour turned the garden into a sea of mud. Our soil is a clay loam and you know what wet clay is like. Sticks like bubble gum to the sole of your shoe!

We tried lubricating the dibbles with vegetable oil from the kitchen. This helped but I still had to use the hose to wash off the sticky clay after every few holes. It was looking as if we'd have to abandon this new device.

Fortunately, Mother Nature relented and we had two nights of hard frost. That was enough to firm up the soil in the raised beds. I was out there in the cold of the morning, dibbling the holes. Again, the dibble worked like a charm. We then planted in the warmer temperatures of midday.

Mary Lou and I agreed that this had been the most pleasant garlic-planting season yet. We finished the 5000 clove plot in five easy sessions of about an hour each, working at a relaxed pace. We estimate that it took less than half the time of our previous method with less bending, less trenching time and uniformly spaced cloves.

The garlic dibble proved to be a very useful tool for use in a small garlic plot like ours. It saves time and backs. Cloves dropped straight. We'll see at harvest time whether any went in upside down!

The one disadvantage is that wet soil makes it difficult to have clean planting holes.

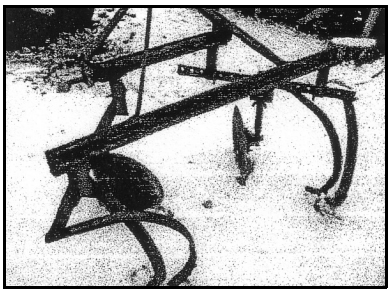
If you don't already have a dibble, I recommend making one this winter to have it ready for fall.

Growing Garlic in Nova Scotia

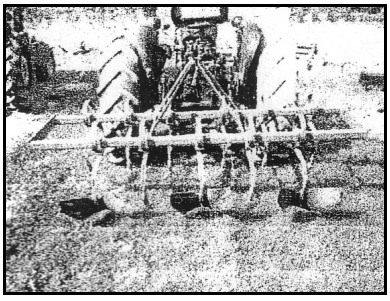
By Clark Wiseman of Dutch Settlement, Nova Scotia

I will be starting to plant tomorrow, September 26 and depending on weather, finishing mid-October. I usually don't mulch until freeze-up, which can be mid-December or later around here.

On my heavy ground, and with the maritime climate, I need to make hills for planting. I used to use a one-row potato hiller, but it required 3' per hill, and I could only drive in one direction because it was offset on the tractor.



The furrowers in the photos came from my local Massey dealer, and combined with the tiller on the other tractor have made the task of constructing hills incredibly easy.

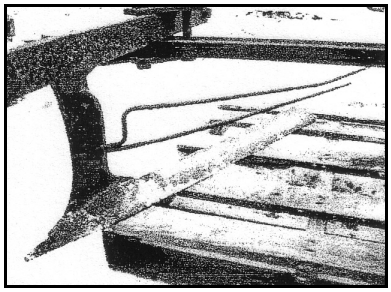


I have a 15" wide furrower centred behind each tractor wheel, and one in the middle. This gives me two beds between the wheels at about 25" centres. I can then turn around and make two more hills immediately adjacent on the same spacing. Some tractor speed is necessary to throw the dirt up in a nice inverted "vee."

I can drive through them again without compacting the original hills, which on my heavy ground is often necessary to loosen the soil for planting, especially if rain has compacted them. I usually make the hills in August just in case the fall turns wet. If this happens, I will try removing the furrowers and leave one cultivator tooth per hill to open the soil for planting. I haven't had to do this yet, but in years past, I have had to plant while up to my ankles in mud, but the tops of the hills stayed dry enough to plant. Clay is amazing stuff!

This shows new ground that has grown nothing but weeds for 30 years. I hope the alternating strip will help me kill weeds between the beds in alternate years, while a heavy layer of mulch limits weeds in the beds.

The strip method gives me convenient places to throw the rocks from the planting beds, so they can eventually be removed and it gives room for tractor and trailer between the beds for mulching and harvesting. It will take years of labour to make this good ground, but the challenge is quite exciting. (Jeez, maybe I need to get a real life!)



This is (formerly) a horse-drawn bean puller that a neighbour gave to me. I want to attach the two spades to the frame for one-row potato hiller that I mentioned. My older tractor has down pressure on the three-point hitch, and I want to try to lift, or at least loosen the garlic so that I don't have to use a fork to pry them out of the ground. The down-pressure should allow me to keep the spades well below the bulbs.

December 2. 1 still have not mulched the garlic this year. We have had so much rain that I can't get near the field. The ground is frozen now, and if it stays that way, I might mulch this week. There is no sign of green shoots, either.

I like to experiment with cropping, and next year, I may grow potatoes in every fourth strip, which would still alloy decent access to the garlic beds. I can get copious amounts of seaweed, which might be the best potato fertilizer I have ever encountered. It keeps the bugs off when the potatoes are grown in it, and in year two, the seaweed makes an excellent soil amendment, still with some manuring value The potatoes are organic and taste great, with noticeable iodine content (you can smell it when boiling them - with several cloves of garlic, of course). I mention this not so much for the gardeners among your subscribers, but for the growers who are trying to make a viable commercial operation.

Co-planting other commercial crops with the garlic makes sense to me. In fact, I would like to hear from others who are taking a similar approach.

The Farmer

The farmer's trade is one of worth
He's partner with the sky and earth
He's partner with the sun and rain
All Four may help him with his grain
For men may rise and men may fall
But the farmer, he must feed them all.

From the Bethel Women's Institute 100th Anniversary Cookbook, "Bethel's Treasures

Starting Over - - -
A Story of Winter Kill During a Harsh Season

By Martin Reichert, Market Gardener

The fall of 2003 was promising to be a good year. We were undertaking a weed control program on the piece of land the garlic was to be planted on. During the garlic harvest the previous season, we had uprooted all the weeds before they had gone to seed with our digger blade. We then worked them back into the soil using a chisel plough and planted the area with buckwheat by the first week of August. By mid-September the buckwheat was knee high and the weeds were only up a few inches. Late September, the buckwheat was worked into the soil with a spring tooth cultivator. Weed control had been satisfactory, but the buckwheat did not break up enough before the garlic was planted and caused problems with the tool that we cut the rows with.

We planted on Thanksgiving weekend. The weather was perfect and we managed to plant 18,000 – 20,000 garlic. In our operation this is done by hand, this year planting three rows at a time, 15 inches apart. This gave us a bed of three rows. To maximize the usage of the land, we used sticks marked at 7" for Rocambole and 10" for Porcelain garlic.

By placing an extra row between 30" centred rows and ensuring proper spacing, we were able plant twice the crop in 15 percent less acreage.

Covering the crop with soil over this large an area has always proved to be a challenge. The soil is primarily clay and does not flow well unless it is really dry and granular. The cloves are covered using a blade that is dragged behind the tractor and a hand rake to bury those that come back up to the surface.

A week later all looked good. Then the rains came. The spot we had chosen to grow the garlic was fairly weed free, and the soil stayed moist even in dry spells. The rains continued to come. Checking the garlic in mid November the soil was still fairly firm and no water was standing.

By the end of November when we went to put the straw on the field, we almost got stuck with the wagon between the rows. We had to wait till the soil froze to be able to cover the crop with straw. We never did get much snow cover on that field all winter. By the March the ditches were filled with ice. The garlic patch as well as the rest of the field had a sheet of ice on it 2-3" thick.

We waited and waited for the garlic to come up. Only a handful of cloves were able to endure the winter. We had waited as long as we could.

Stewart worked up the soil and planted a crop of organic soybeans. He had wonderful crop of beans, where the garlic had been planted. We've noticed that garlic cultivation does something to the soil that seems to enhance cash crops the next year. Stewart is a cash crop farmer who humours me in my attempts to grow garden crops on his certified organic farm.

Starting over in Fall 2004.

We decided to take the summer off and regroup.

We chose a piece of land that we had previously used for a market garden plot, and worked it regularly to get rid of the weeds. We contacted growers we had met at the Seaway Garlic Festival and some listed in the Garlic News for seed.

Luckily we had collected garlic bulbils the year before and planted these. During the month of August we were digging these precious bulbs out of the soil, the offspring of the crop we had lost. Most of the Rocambole was of a nice size when we harvested them. The Porcelains were smaller and quite a challenge to find in the soil as all tips had dried up after the wet summer we had.

Many of the garlic growers in Eastern Ontario remind me of artisans. They take such pride in their work, producing a product of high quality. It is almost as if the garlic is crafted to prepare it for sale. Needless to say in my search for new garlic, I was introduced to some new varieties that I am excited to be growing. The garlic that was grown from bulbils has all been planted and I am looking forward what this undertaking will yield.

This year, we planted in the same soil, new location, in raised beds 30" wide, 8" high, 3 rows spaced 12" apart. Rocamboles were planted with a spacing of 4", using a 14" ruler. Porcelains and larger garlic bulbs were spaced at 6" between cloves. Compost was worked into the raised bed before planting. Rows were back filled using a hand rake.

The combination of the raised beds and the depth of the rows made it easy to ensure the bulbs were well buried and stayed. Straw was placed over the raised beds the third week of November to a depth of 1-2".

We planted 8 1/2 beds of garlic in rows 140 feet long. If every thing goes well, we should harvest between 4000 to 6000 garlic bulbs this year.

In our first year of growing garlic, we had planted this same number of cloves in an area that was about a third of an acre. This year we have used about ¼ of that space. This will allow us to ensure the garlic receives enough nutrition and water at the appropriate times. The weeds will also be easier to manage since everything is scaled down. The journey this past year has almost been like reinventing ourselves. A new crop and some new ideas thanks to our friends in the garlic business, it looks like it's going to be another good year.

Wishing you all the best in the New Year and Happy Gardening.

— Caitlin, Lorna & Martin.

A good farmer is nothing more nor less than a handy man with a sense of humus.

— E. B. White, 1899, American author and humorist

What is pyruvate analysis and how is it used to determine the pungency or flavour of garlic?

By Jennifer Allen, Vegetable Crop Specialist, OMAFRA

Let's start at the beginning — what is pyruvate?

Pyruvate is a bio chemically important molecule. In animals, pyruvate is formed during the breakdown of proteins and carbohydrates and is essential for the production of energy.

In garlic (and other Allium species), pyruvate is produced when garlic tissue is damaged. When garlic is intact, the flavour precursors, the molecules responsible for what makes garlic taste like garlic, are separate from allinase, the enzyme responsible for the conversion of flavour precursors to thiosulfinates (e.g. allicin). When garlic tissue is damaged, the two come into contact and chemical reactions occur. Allinase helps to convert the flavour precursors, which are called ACSO, to thiosulfinates. At the same time, pyruvate is formed as a reaction by-product. An analogy might be cheese production. To make cheese you take milk (ACSO) and heat it (allinase), and then you strain to separate the whey (pyruvate) from the cheese (thiosulfmates).

Taste panels have shown that pyruvate is directly proportional to pungency. The more pyruvate produced, the more pungent the garlic. So, how do you increase the amount of pyruvate? Garlic varieties with higher levels of ACSO will produce more pyruvate, and be more pungent then those with lower levels of ACSO.

So, how can you grow garlic that is more pungent? Well, first of all, pungency is related to both genetic characteristics of a particular strain as well as environmental conditions. Choosing varieties known for their pungency is one option. Environmentally, researchers have shown onions grown in high sulphur soils have higher concentrations of sulphur (and more ACSO) then when the same variety is grown in low sulphur soils.

It's important to note that pyruvate is only an indicator of pungency: it doesn't play a role in flavour or pungency.

Herbicide Residues in Soil

I contacted Leslie Huffman with questions on the problem of pesticide residues in soil. Leslie provided the following answers as well as the accompanying article. Editor.

Q. Pesticide residues in soil concern organic garlic growers due to the unknown history of their soil. In trying to answer queries, I have found a lack of clarifying information.

A. I'll insert some replies to your questions. My experience has not been with garlic, but I have seen similar problems with many hort crops; sugar beets, tomatoes, grapes & strawberries.

Q. Are cornfields particularly risky, and, how many years before that soil can be considered pesticide-free?

A. The main problems have been after corn and soybeans. If the conditions for herbicide breakdown are not right, it may never be safe. However, we have seen fields with Pursuit that were "safe" after 2 or 3 years where the soil pH was above 6.0 so the soil microbes could work.

Q. What soils tests can be done to check for residues?

A. Chemical tests are available but expensive, about $600 per sample. Field bioassays are ok, but take a year. Greenhouse bioassays may help, but interpreting them is tricky. All tests are limited by how representative your samples are.

Q. Are there crops that can be used to "clean-up" the soil.

A. Corn can be used to clean up atrazine. Most other herbicides depend on soil microbes to break them down.

Q. Is the residue likely to be absorbed by root crops like garlic?

A. Possibly, although usually we see stunting or plant death and don't get to the point where we might be concerned about levels in the bulb.

Q. What is the persistence of the various pesticides in soil in years? Is there a chart or table available?

A. The new version of Pub 75 should be out on Feb. 1, 2005.

Q. Does glyophosate help to spread soil-borne diseases like fungi, clostridium, etc? Roundup is getting a lot of attention these days!

A. There is some research that shows that low levels of glyophosate may make plants more susceptible to disease. Most of these papers are published in non-weed journals. I was hoping for some time this winter to look for some of these reports, but it hasn't happened yet. It is a real concern.

Herbicide Residues and Soil pH

By Leslie Huffman, Weed Management Specialist, Hort Crops, OMAF, Harrow

Herbicide residues from previous crops can damage horticultural crops. Most growers know about this problem, but may not realize the effect of soil pH on herbicide breakdown, which can extend the problem for many years after the herbicide application.

For many years, triazine herbicides have caused damage to subsequent horticultural crops, and more recently, Group 2 herbicides, mostly ALS inhibitors like Pursuit and Broadstrike products, have caused damage to rotational horticultural crops. But what does this have to do with soil pH? The soil pH dramatically affects how quickly natural processes in the soil break down herbicides, especially by soil microbial breakdown. In fact, if the soil pH is out of the proper range, herbicide breakdown may be totally stopped for many years.

We know that imazethapyr, the active ingredient in Pursuit, and flumetsalem, the active ingredient in Broadstrike, break down extremely slowly when the soil pH falls below 6.0. Applications of lime will slowly raise the pH above 6.0, and only after the pH moves above 6.0 will the herbicide break down at a normal rate. It may take several months for lime to raise the soil pH.

We also know that the post-emergent herbicides, Classic and Peakplus break down very slowly when the pH is above 7.5. Atrazine breakdown is also very slow at high pH levels above 7.5. Sulphur applications may help, but it is difficult to lower soil pH significantly with sulphur.

In sensitive crops like sugar beets, cole crops, strawberries, grapes, and tomatoes, we have seen both small and large circles of herbicide injury in many fields and soil types, including sand, loam, and clay. The challenge has been to detect these areas before growing sensitive crops. Once the pH drops below 6.0 or rises above 7.5, herbicide breakdown virtually stops. If you are doing composite soil samples, i.e. one sample for 10 or 20 acres, these low pH circles may not be detected.

Areas of high soil pH can also be spotty across fields, and some areas of the province are generally high in soil pH.

Another concern is the dry conditions over the past several years that may have decreased soil microbial and chemical activity, leading to less herbicide breakdown. (Abridged)

Growing Garlic from Bulbils

By Sonia Stairs and Henry Caron of Boundary Garlic, Midway, BC

Garlic Bulbils

Bulbils offer an alternative approach to growing garlic that avoids soil borne disease.

Bulbils form if a scape is allowed to mature. The scape is the stalk growing out of a hardneck bulbil. Although it is sometimes referred to as a "garlic flower" it is not really a flower. Like cloves from a bulb of garlic, bulbils propagate garlic vegetatively and the bulbs that grow from them are clones of the parent plant.

The bulbil capsule can contain from ten or less to a few hundred bulbils, depending on the variety and the conditions.

Bulbil Sizes Differ Greatly

Rocambole garlic produces some fifteen to thirty bulbils that are huge by comparison with the bulbils from Porcelains. Rocambole bulbils can be as large as the tip of your baby finger and are strongly coloured. Most Porcelain bulbils are pale and closer in size to a grain of rice, with more than a hundred bulbils to a capsule. If the bulbil capsules are left on the plant until after the usual harvest time for bulbs of that variety, even Porcelains produce some plumper bulbils with a blush of pink. Purple Stripe garlic produce bulbils, which are between Rocamboles and Porcelains in size and quantity. Purple Stripe bulbils vary a lot in size within a single capsule.

Pros and Cons of Propagating from Bulbils

The advantages of propagating from bulbils are two-fold. First, there are many more bulbils than cloves and so you can increase your planting stock faster. Secondly, since the bulbil capsule does not touch the earth you can avoid soil borne diseases and pests.

The downside is that it takes several years to grow full sized bulbs from bulbils and in the first year for Porcelains the plants are minute, almost requiring a magnifying glass to weed. Also, when the bulbils are left on the bulb to mature, the bulb will usually be considerably smaller.

Our Experience with Bulbils

With Rocamboles we find it takes about two years to produce a decent sized bulb from bulbils, longer to reach full size. Some people have the knack of producing rounds, or singles, from bulbils in the first year. When these large round cloves are planted they produce a full sized bulb in the second year. More usually the bulbils will produce small bulbs with small cloves the first year and the small cloves will in turn produce medium sized bulbs the second year.

With Porcelains it takes at least three years to produce decent sized bulbs. At the end of the first growing season you harvest teardrops of varying sizes. When these are planted, the next harvest usually consists of small bulbs. When the cloves from these are planted you are on the way to decent sized bulbs in the third harvest. It may take a further year or more for the bulbs to reach their full potential in your garden.

We grew our favourite Porcelain, Leningrad, up from bulbils and it was worth the effort. Our Leningrad is very well adapted to our farm and we achieved a substantial seed stock for very little cash outlay. Since the Porcelains have fewer cloves on average than the other hard necks, it takes many years to build up a commercial seed stock using bulbs alone.

Because the Purple Stripe bulbils vary so dramatically in size the first year harvest also has a vast size range. We haven't grown Purple Stripes out to full size as the bulbs have so many even sized cloves that it does not seem worth the effort, unless there is a soil borne problem.

We are not sure whether bulbil is the correct term to use when a stressed bulb produces "bulbils" in its stalk. ln 2004 several of our Asiatics, Turbans and Artichokes, which had not yet acclimated to our farm before they were hit severely by the hard winter of 2003, produced these bulbils. We planted them in the fall of 2004 and mulched them and they are doing well this spring. We have noticed that when severely stressed, the hard necks sometimes produced larger than normal bulbils.

Harvesting Bulbils

We cut the fully mature bulbils on long stalks before harvesting the bulbs so that there is no contact with dirt. Then we tie the stalks in bunches, hang them until well dried, snip the bulbil capsules off and store them in brown paper bags.

When and How to Plant

With the Leningrad we planted the bulbils and the first-year, teardrop-shaped bulbs in the spring and we have also planted Rocambole bulbils successfully in the spring. Last fall we planted small numbers of several varieties of bulbils and first-year bulbs under mulch. When we pulled the mulch back this spring they were all doing fine. The advantage of fall planting is that you don't have to be concerned about the bulbils drying out over winter if you do not have ideal storage conditions. On the other hand, you can lose them over winter in the ground.

Porcelain bulbils are so small that the first year we plant them close together in a bed of several rows so they are easier to weed. They are shallow rooted the first summer and so they need frequent watering. One missed watering on a hot day can stop the growth for that season. It is a good idea to harvest them before the tops have died down completely or else they are hard to find in the soil. The larger Rocambole bulbils can be spaced more like you would cloves.

If we were to do any large scale growing up from Porcelain bulbils again we would select the largest bulbils to begin with and discard the smallest plants from the first year harvest. The bulbils are plentiful and the weeding is tedious.

Planning your Garlic Festival

A Garlic Festival is the best marketing tool and market for local garlic that any group of growers can arrange. You will sell more garlic in a one or two-day weekend than you can imagine. Why? Simply, if well organized, you assemble huge numbers of eager buyers for your garlic and garlicky foods in one place on one weekend. They come to buy.

Festival Production

From the public's point of view, there are several ingredients that contribute to a successful Garlic Festival. Most essential is lots of garlic, growers selling freshly harvested, locally grown garlic, in as much variety and choice as possible. Delicious garlic-seasoned food is also a big draw.

Information and education through the garlic lectures and chefs cooking demonstrations justifies the entry fee. Light, casual entertainment of street musicians, buskers, clowns and face painters is needed for success, for without it, the event is just a gathering and not a festive occasion.

Advertising & Promotion

The best publicity is free publicity. Paid advertising is not nearly as effective as a story that runs in a newspaper. For the 1st Glorious Garlic Festival, I spent zero on advertising. It took a lot of work, writing articles for the media and making phone calls but the work was worth it. The event was carried both locally and internationally and drew over 4000 visitors! It was an outstanding success. Good planning must be done before advertising and promotion can begin, and that includes working through all of the steps in the production of a Festival. Start your promotion and publicity program as early as possible. Attract the attention of the press. If at all possible, find story interest in the Festival that you can spread around for several months before the event.

Personalities

The media look for characters. Canada's garlic darling, Ted Maczka, wears garlic pattern boxer shorts over his trousers, a black felt hat or baseball cap with his F3 garlic on the peak and a full white beard combed to a point, and he tells tales of the wonders of garlic. The press just loves him. To promote the early garlic festivals in Perth and Carp, I personally spent a lot of time on TV appearances in the role of the "garlic guru," playing the character of a country bumpkin, wearing an old straw hat festooned with garlic bulbs. It worked! Include dignitaries as well as top garlic world personalities in your program. Start with your local people and work outward. David Stem of the Garlic Seed Foundation in NY came to provide the serious, professional side of garlic in 2000 when we moved the Eastern Ontario Garlic Festival to Carp outside of Ottawa. As well, I had Mayor Bob Chiarelli formally welcome the eastern area growers to his city and do the presentation of a lifetime award to Ted Maczka. Personalities draw the public to the event.

Lessons

The lessons I've learned in over a decade of organizing and helping others with garlic festivals in Ontario follow:

1. Planning. Start early, a year ahead in order to make all the arrangements and to get the necessary promotion and advertising in place.
2. Make these decisions before planning gets into too much detail;
   a. Date(s) of the festival;
   b. Location, location, location. Pick the site for its facilities and its easy access to visitors;
   c. Festival identity. Pick a name for the festival and a garlic logo for advertising. Use them on all promotion.
   d. Target your market and define your territory to enable managing the event.
3. Form a Committee. A festival takes a lot of work. Get those people, both the planners to do the organizing as well as the "one-shot" volunteers needed on the day of the event. Organize by the willingness of people to do tasks. Don't forget the vendors. They may not work the event, being interested only in their own sales, but the event is being run for their benefit. Listen to their ideas.
4. Administration. There's a lot of nitty-gritty work. Unfortunately, meetings are needed. These can be as informal as you wish. Nominate someone to be the event chair or coordinator. Have a secretary to take minutes of meetings. Keep good records.
5. Control your money, especially cash. Counting cash is absolutely necessary to the success of a Festival and not doing so spells failure. Select a trusty treasurer to control expenses. Prepare a "living" budget, one you can change as your income increases Open a bank account. All financial transactions must be by cheque and approved. Deposit all cash to the bank account and pay bills only by cheque, never cash.
6. The event itself. Hold a brainstorming session to generate ideas; pursue only those for which someone volunteers to run, put all others on the back burner.
7. Prepare a program for the event. Include;
   a. an opening ceremony with invited dignitaries and personalities;
   b. garlic lectures and braiding demos;
   c. garlic cooking talks & demos, at least two before lunch, one or two after;
   d. interest catchers - garlic breath contest, garlic competitions, best garlic costume, best stall, children's activities;
   e. a press briefing and press information file.
8. Charge an admission fee. I believe that a Garlic Festival is worth $5 entry fee just to cover the costs of advertising, entertainment, chefs and speakers honoraria, facilities costs, toilet rentals, prizes, etc.
9. Recruit your garlic and food vendors early and charge them a vendor stall fee.

Good luck! With good planning and execution, your festival will be a stinking success! Customers will make it so.

Succeeding With Your Garlic Enterprise

By Marlene Werry, Client Account Officer, OMAF, Belleville

Eastern Ontario has seen a significant increase in the number of farms with a small acreage of garlic. Many of the growers are new entrepreneurs - people who have decided to take a chance on themselves and their capabilities. Working at home, on the farm, requires perseverance, self-motivation, and a talent for time management. Feasibility analysis and thorough business planning will help reduce the risk of failure in launching a new product or enterprise. There are a number of considerations in starting a garlic enterprise:

- Be confident that growing garlic interests you, there is a demand and you have the expertise.
- Do your market research. There is no ready market for the garlic. You will need new customers. Define your potential customers, or target market. Describe how you will access your target market, and how much it will cost. For example: farm gate sales, farmers' markets, garlic festivals. You need a well thought out sales strategy.
- Do a complete business plan. Taking the time and effort to create a complete business plan will help with understanding the nature and complexities of growing and marketing garlic. Be conservative when you estimate the amount and timing of your revenues. Detail your pricing strategies. What will your customers pay? If you can't recover your costs at this selling price, then reconsider your venture. Know your start-up costs and cost of production.
- Obtain all necessary licenses, permits and registrations. i.e. zoning by-laws, road access and signage, labeling of processed products etc.
- Have business cards, brochures & stationery printed by professionals.
- Advertise. Make use of free publicity.
- Self-market! Find out about potential customers before you try to "sell" them.
- Maintain a separate business line and establish your office away from living areas.
- Check on any extra insurance needs.
- Set-up a record-keeping system - know your cost of production/inventories.
- Join garlic associations, business community associations, subscribe to industry newsletters/magazines, network to establish contacts. Don't be afraid to ask the experts.
- Check both federal and provincial taxation requirements.
- Sell value and stand behind your product.
- It is advisable to build a successful local and Canadian enterprise before trying to export.

If you are planning to start growing garlic, you want to be successful. You want the satisfaction that comes with owning a well-run profitable enterprise. To achieve your goal, plan carefully. Should you decide that growing garlic is right for you, there are many resources to help you get started.

Marketing

An important part of your Plan should focus on "marketing" your garlic. You've taken all this time preparing your soil, planting, mulching and harvesting your garlic and now how are you going to sell it at a good price?

It is not the purpose of this brief article to have you graduate from Marketing 101. For additional reading there are many books and websites on this subject. However, here is a definition of Marketing that was downloaded from the Internet, "Marketing is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, services, organizations, and events to create and maintain relationships that will satisfy individual and organizational objectives." **Wow! and all I wanted to do was sell garlic.**

First of all, let's talk about pricing. In Eastern Ontario where most of the garlic is grown in small plots and handraulically planted and harvested, retail selling prices range from $4.00-$6.00 per pound for conventional and $5.00- $9.00 per pound for Certified Organic.

Secondly, since most of your sales will be at festivals or farmer's markets consideration should be given to how your garlic is presented to your customers. Here are a few things to consider:

- If you can, set your stall or booth next to, or between other garlic stalls.
- Greet customers into your booth cheerfully. Learn their names.
- Ensure your garlic is cleaned properly & displayed attractively. Quality sells.
- Display prices. Many customers will walk away rather than ask.
- Don't underprice. "Cheap" is the same as "Low Quality."
- Know your varieties and strains and be ready to answer questions;
  - How is it grown, organic practice vs use of herbicides and pesticides
  - How to use garlic
  - Medicinal properties.
- Have product literature available as handouts and promotion.
- Educate your customers. "Scape! What's a scape ??" ... they'll ask.
- Handle samples properly using good hygiene. Check with your local health unit.
- Don't ask customers to try a sample. Ask if they have ever tried
  - Scape paste with "light" cream cheese?
  - Pickled garlic or scapes?
  - Garlic jelly or whatever other products you have?
- Set your tables at the rear of the booth so your customer is in the shade.
- Don't smoke or eat in your stall. Be attentive.
- Invite customers back ... "See you next Saturday."
- Why not provide a free sample of a garlic strain for a repeat customer to try.
  - It may generate a future sale.
- Above all, BE ENTHUSIASTIC!!

Garlic Grading Gadgets

You can estimate the weight of your garlic crop using a simple device that measures the bulb sizes. Here are a couple of easy-to-make garlic gadgets that you can make in your home workshop.

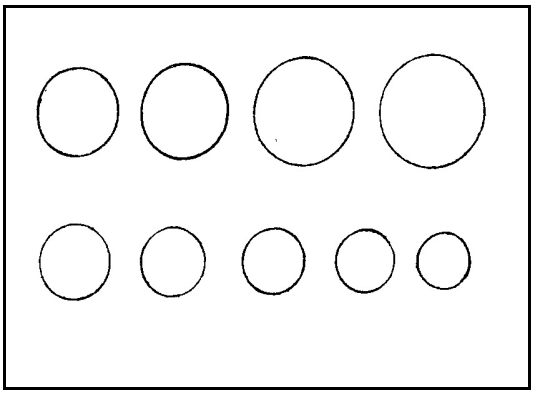
Wooden Garlic Grading Device

Using the grade sizes adopted by the Garlic Growers Association of Ontario for grading "Music" garlic, you can make a grading device that can be adapted or calibrated for other types of garlic.

These will be your markers for centering each hole. Then, mark off centres for each grade size along the lines. Make sure you leave at least 3/4" space between the edges of each circle. Cut the holes and finish the cut edges with sandpaper.

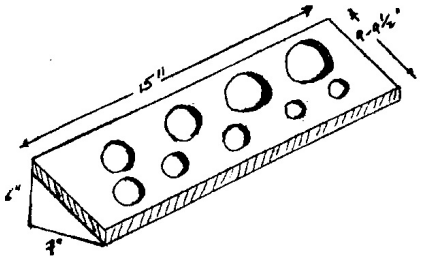
Note: If you have a hole saw set, it's easy to cut the holes quickly. Otherwise, use a router, or else, cut them out with a scroll saw.

Title each hole with the grade size, diameter and number of bulbs per pound for future reference, using a dark marker. Mount it on two pieces of angled 1x10 pine so it sits at a convenient angle for use. Erase off any pencil lines, give it a couple of coats of outdoor polyurathane and your grading device is ready for use!

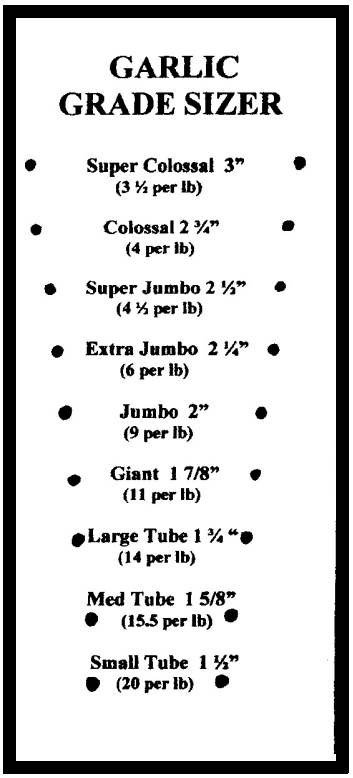


On right is the template mounted at an angle.

On left is plan layout of grading template. Holes run from Super Colossal, 3" diameter on upper right, descending in size to Small Tube, 1½" diameter, on lower right.



Make Your Own Garlic Grade Sizer



This one is simpler and can be made in a few minutes. Start with a piece of finished 1x4 pine board, 10" long. Use 3" finishing nails. Run a light pencil line down the centre length-wise. Starting 2" from one end, mark off spaces at 3/4" intervals to correspond with each grade size. Measure and mark dots on either side of line for each grade size. Drive a 3" finishing nail ½" into the board at each dot. Using a dark marker, write grade size between pairs of finishing nails. Finish with outdoor varathane and it's ready for use at harvest! To use, slide each bulb from the large end. It sops between two nails at its grade size.

See chart on right for approximate weights (bulbs per lb).

GGAO GRADE SIZES FOR MUSIC GARLIC			
GRADE SIZE	**DIAMETER**		**BULBS/ POUND**
Super Colossal	3"	75mm	3.5
Colossal	2.75"	70mm	4
Super Jumbo	2.5"	65mm	4.5
Extra Jumbo	2.25"	55mm	6
Jumbo	2"	50mm	9
Giant	1 7/8"	47mm	11
Large Tube	1 3/4"	44mm	14
Medium Tube	1 5/8"	41mm	15.5
Small Tube	1 ½"	37mm	20

To calibrate grades for other types of garlic, select at least 10 bulbs in each grade size. Weigh them to find total weight. Divide weight by the number of bulbs to find average bulb weight. Divide 1 by the average bulb weight to find the number of bulbs per pound for that grade size.

All varieties are not created equal!

Garlic Mathematics For Small Garlic Growers

Did you hate math in school? Too bad! Every business needs a good working grasp of numbers, the growing and selling of garlic being no exception. *The Garlic Newsletter* has compiled a list of useful facts, numbers and calculations to help you with your arithmetic.

Land Measures

One Acre = 43,560 square feet	or about	209 feet by 209 feet
½ Acre = 21,780 square feet	or about	147 feet by 147 feet
¼ Acre = 10,890 square feet	or about	105 feet by 105 feet
1/10 Acre = 4,356 square feet	or about	66 feet by 66 feet
1/20 Acre = 2,178 square feet	or about	46 feet by 46 feet

(For metric mathematicians, multiply acres by 0.40468 to get hectares, feet by 30.48 to get centimetres.)
Whatever size you select, you will need three times as much land for a three-year organic rotation.

Land Capacity (or how much garlic can you plant in a plot)

This is a large variable. It depends on row spacing, in-row planting density and variety of garlic and amount of waste space between rows or groups of rows. Two examples of an acre of garlic show the possible extremes.

Example 1: Porcelain garlic planted at an 8 inch spacing, rows spaced at 36 inches gives 21,780 bulbs/acre.
Example 2: Italian Red (Artichoke) garlic planted at 3 inch spacing, rows spaced at 18 inches gives 116,160 bulbs/acre.

That's a vast difference! Yours will be somewhere in between, likely around 30,000 to 40,000 bulbs/acre.

Number of Feet of Row in Different Size Plots

Plot Size	36" Rows	Double Forty	18" Rows	36" Beds of 3 Rows
One Acre	14,520 ft	16,335 ft	29,040 ft	26,136 ft
½ Acre	7,360 ft	8,167 ft	14,520 ft	13,068 ft
¼ Acre	3,630 ft	4,084 ft	7,260 ft	6,534 ft
1/10 Acre	1,452 ft.	1,634 ft.	2,904 ft	2,614 ft
1/20 Acre	726 ft.	817 ft	1,452 ft	1,307 ft

Labour-Intensive Manual Tasks Unique to Garlic

Operation	Labour or Rate of Production
1. Cracking over mature bulbs	40-60 lbs/hour (350-600 bulbs/hour)
2. Cracking table garlic	25-35 lbs/hour (200-300 bulbs/hour)
3. Hand Planting (into prepared rows)	15-20 minutes/100 foot row (50-100 hours/acre)
4. Hand Mulching	At 4 square bales/100 foot of raised bed, mulching takes 10-15 minutes/100 feet
5. Popping Tops or Scaping	1500-2500 plants/hour. Repeat operation three times over a week.
6. Harvest-lifting, cleaning & grading	200-800 bulbs/hour, varies with soil, method & worker skills
7. Harvest-trimming roots & stems	400-600 bulbs/hour, varies with worker skills

Add labour & machine costs common to growing *any crop* to the above.

Selling for Profit or at a Loss

Whether you make or lose money on your garlic depends on how well you grow your crop and prepare it for market, the price and your marketing. At year end, calculate your costs and sales and prepare a financial statement. As a minimum include:

Income - sales of scallions, scapes, table garlic, seed garlic
- dollar value of planting stock retained for replanting
- dollar value of garlic for own use, gifts and promotion

Expenses
- cost of growing including labour, machine costs, seed, fertilizer, mulch
- cost of marketing including advertising, product samples, vendor fees, transportation cost
- indirect costs such as organic certification, memberships

The difference between the two is your **profit or loss**. If you suffer a Loss, you can either try to reduce costs, increase your selling price (only if you were selling below market), or go back to pumping gas at the local service station. Increasing your planting is not a solution—it will serve only to increase the total of your loss. If you made a profit, look for growing more, but no more than what you can sell at a profit.

Plot in Acres	Sq. Ft. In Plot	Square Ft. x Ft.	No. Of Feet of Row in Plot in Different Spacings				
			36" Row Spacing	Double Forty	Single Rows @18" Spacing	3 rows in 36" Bed, 2' Apart	2 rows in 18" Bed 18" Apart
1 Acre	43,560	209 x 209	14,520 ft.	16,335 ft.	29,040 ft.	26,136 ft.	29,040
No. of plants @ 6" spacing			29,040	32,670	58,080	52,272	58,080
No. of plants @ 4" spacing			43,560	49,005	87,120	78,408	87,120
½ Acre	21,780	147 x 147	7,260 ft.	8,167 ft.	14,520 ft.	13,068 ft.	14,520 ft.
No. of plants @ 6" spacing			14,520	16,334	29,040	26,136	29,040
No. of plants @ 4" spacing			21,780	24,501	43,560	39,204	43,560
¼ Acre	10,890	105 x 105	3,630 ft.	4,084 ft.	7,260 ft.	6,534 ft.	7,260 ft.
No. of plants @ 6" spacing			7,260	8,168	14,520	13,068	14,520
No. of plants @ 4" spacing			10,890	12,252	21,780	19,602	21,780
1/10 Acre	4,356	66 x 66	1,452 ft.	1,634 ft.	2,904 ft.	2,614 ft.	2,904 ft.
No. of plants @ 6" spacing			2,904	3,267	5,808	5,227	5,808
No. of plants @ 4" spacing			4,356	4,900	8,712	7,841	8,712
1/20 Acre	2,178	46 x 46	726 ft.	817 ft.	1,452 ft.	1,307 ft.	1,452 ft.
No. of plants @ 6" spacing			1,452	1,633	2,904	2,614	2,904
No. of plants @ 4" spacing			2,178	2,450	4,356	3,920	4,356

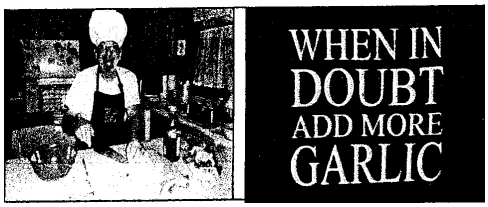
Using the Planning Chart:

1. Examine the chart carefully. You can get more or less yield per acre depending on the row spacing arrangement you adopt. You can work either from a fixed size of plot and make decisions on spacing of rows in order to get more or less plants in the plot, or, you work back from the number of plants figures in order to determine the size of plot you will need.
2. Note that rows spaced at 18" give you double the number of plants per acre compared to rows spaced at 36", thus, doubling your crop size.
3. "Double Forty" is a system that uses a raised bed that fits between tractor wheels, and is planted with 2 rows per bed. It is used by those growers who have developed tow-behind cultivating, planting and harvesting equipment.
4. Remember to multiply your plot size by 3 in order to provide for a 3-year organic rotation of your crop.
5. Porcelains are usually planted at 6" spacing, all others at 4" spacing in order to allow for good bulb development.
6. For plot sizes larger than one acre, simply multiply the one-acre figures by the number of acres you wish to plant.
7. For metric measurements, multiply acres by .40468 to get hectares, feet by 30.48 to get centimeters.

CALCULATING THE AMOUNT OF GARLIC NEEDED FOR PLANTING STOCK

The greatest variable when calculating seed garlic is the bulb size. This chart, based on an acre of garlic planted with a 4 cloves/bulb Porcelain-type at a density of 29,040 plants/acre shows the seed costs of different bulb sizes.

Grade Size	Bulbs per lb.	Cloves Needed	Bulbs Needed	No. Of Lbs.	Cost @ $5.00/lb
Super Colossal	3.5	29,040	7,260	2,074	$10,370
Colossal	4	29,040	7,260	1,815	$9,075
Super Jumbo	4.5	29,040	7,260	1,613	$8,067
Extra Jumbo	6	29,040	7,260	1,210	$6,050
Jumbo	9	29,040	7,260	807	$4,033
Giant	11	29,040	7,260	660	$3,300
Large Tube	14	29,040	7,260	518	$2,593



Winter Lentil & Garlic Soup

by the Garlic Guru in Mary Lou's kitchen

Over the winter, I tried out soup recipes using dried peas, beans and lentils with garlic. This one started as a book recipe but I adjusted and changed ingredients until it came out superb. Perfect for those cold days of autumn, winter and spring.

Ingredients:

8 oz. Dry lentils
4 cups water
1 onion, chopped
3 potatoes, peeled & cubed
3 carrots, finely sliced
8 large garlic cloves, finely minced
3/4 cup finely chopped celery
1 tsp dried marjoram
1 tsp dried basil
1 bay leaf
1½ cups chopped tomatoes
salt & pepper to taste
lime juice (optional

Method:

Rinse lentils. Put in a 6-quart pot with the water, onions, potatoes, carrots and seasonings. Bring to a boil, let simmer, covered, until the vegetables are tender and the lentils very soft. Add tomatoes and simmer for about 15 minutes more.

Salt & pepper to taste. If needed, thin with tomato juice. Serve hot with a thick slice of garlic bread. Add a dash of lime juice to add some zing.

Provençal cooking is based on garlic. The air in Provence is impregnated with the aroma of garlic, which makes it very healthful to breathe. Garlic is the main seasoning in bouillabaisse and in the principal sauces of the region. A sort of mayonnaise is made with it by crushing it in oil, and this is eaten with fish and snails. The lower classes of Provence often lunch on a crust of bread sprinkled with oil and rubbed with garlic.

Alexandre Dumas (1802-1870) Grand Dictionnaire de Cuisine

Mary Lou's Original Garlic Jelly

Mary Lou developed this recipe for the 1st Glorious Garlic Festival held in Perth, August 16, 1997. It has been featured at festivals since that time and is still as popular as ever. It is offered here for you to try for yourself.

Ingredients:

¼ lb peeled garlic cloves
2 cups white vinegar
5 cups sugar
1 3-oz pouch of liquid Certo

Method:

In a food processor, blend garlic and ½ cup vinegar until smooth. In a 6-8 quart saucepan, combine garlic mixture with remaining ingredients and bring to a boil, stirring constantly. Quickly, add Certo, return to a boil and boil hard for 1 minute, stirring constantly. Remove from heat and immediately fill hot, sterilized 250 ml jars with jelly mixture, leaving a ¼ inch headspace. Wipe jar tops and threads clean. Place hot lids on jars and apply screw bands firmly. Check snap lids for pop down when cool. Makes about 6 jars.

Flavour Change in Garlic

Garlic changes in flavour depending on how you prepare it. Try these different ways:
Raw garlic – the strongest flavour
Roasted garlic – the mildest, nutty flavour
Whole cloves – mild flavour
Sliced cloves – mild flavour
Chopped cloves – medium flavour
Crushed or pressed cloves – strong flavour
Crushed, covered in olive oil and heated to almost boiling –my favourite way to bring out the full, mellow taste.
Never overcook garlic or you lose its food value!

Recipes Using Roast Garlic

Roasted whole garlic has a sweet, nutty flavour and smooth consistency. Roasting produces a milder garlic glamour with a less pungent odour. Once roasted, it can be used in an endless number of recipes.

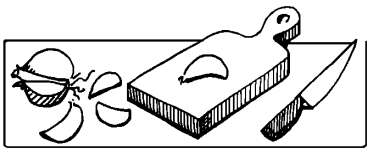
Roast Garlic may be used immediately or kept in the frig for a few days to use later. When needed, just peel or squeeze the soft clove from the wrapper with your fingers.

Here are a few ideas on serving roast garlic:

1. As a low-fat spread on bread or crackers
2. As a side dish or vegetable
3. In sauces
4. Mixed with mayonnaise for a tasty dip
5. Spread on fresh whole wheat bread, with or without creamy cheese
6. Add to extra virgin olive oil and balsamic vinegar for dipping oil
7. Blended with roasted eggplant for a savoury dip
8. Added to fresh basil pesto instead of raw garlic
9. Whipped with mashed potatoes and butter
10. As a pizza topping
11. Stuffing tomatoes with a mix of roasted garlic, cream cheese, lemon juice, salt and herbs
12. With goat cheese and fruit chutney on Melba or Swedish toast
13. Added to chicken, beef or pork gravies
14. With pasta salads
15. Mixed with butter to spread on fresh corn
16. Added to desserts! Baked and peeled cloves can be used in brownies, ice cream or chocolate sweets.
17. And anywhere you use garlic but want a milder flavour.

Garlic, Let it Sit!

In order to obtain the cancer-fighting effect of garlic, you should let it sit for about 10 minutes after being crushed, especially if you are then going to cook it. Heating garlic immediately after it has been crushed destroys its ability to retard a cancer-causing agent.



Medicinal Garlic Soup

This recipe was sent by Karen Poce of Chesley, Ontario, as a relief for nose and chest congestion due to a cold or bronchitis. Make it while your garlic is fresh and freeze it for the winter.

Ingredients:

1 litre chicken stock
1 or 2 heads garlic, peeled & chopped
5 sprigs fresh parsley, chopped
6 sprigs fresh cilantro, chopped
or, 1 teaspoon ground oriander seed
1 teaspoon lemon pepper
1/3 teaspoon dried mint leaves
1 teaspoon rubbed basil
1 teaspoon curry powder
Tabasco sauce to taste (1-2 drops)

Method:

Place all ingredients in a pot and bring to a boil. Do not cover. (Inhaling the fumes will start recovery.)

Reduce heat and simmer for 30 minutes. Allow to cool slightly, then, either puree for maximum effect OR you may strain and drink the broth. Makes 4 servings.

Here's a sampling of some of the recipes from Don Krock's recipe collection.

Garlic Feta Spread

This simple exquisite mixture in one of the most versatile creations ever.

Ingredients:

2 cloves garlic
¼ cup mayonnaise
200 grams firm feta cheese
freshly ground black pepper to taste

Method:

Mince garlic in food processor. Add feta cheese and process until cheese is a fine powder. Add mayonnaise and pepper. Blend well. The recipe can be altered to suit your taste buds by increasing or decreasing the amount of garlic.

Serve it on crackers, celery, endive, raddichio, sandwiches, toast—just about anything. The addition of dill is a great taste companion and for special occasions add smoked salmon to the creation. Warning—it is addictive!

Pickled Garlic

A wonderful woman who wishes to only be identified as Audrey bought some garlic at the Herbfest near Almonte. Two weeks later, Audrey presented me with a jar of pickled garlic and the recipe. I have sampled many pickled garlic recipes, but this on is to die for. Each clove is a treasured taste experience. The outcome is worth the labour of peeling. However, if anyone has short-cut answers to peeling garlic, please let me know!

Ingredients:

In one pot, combine the following:
2 cups peeled garlic cloves (about 8-10 bulbs)
¼ cup sugar
1 cup vinegar
1 ½ tsp. salt
½ tsp. mustard seed
1 bay leaf or whole cloves or pickling spices

Method:

Bring to boil, cook 1 minute. Please in covered jar and refrigerate 24 hours.

About Ukrainian Recipes

Ukrainian cuisine is closely linked to the customs, culture and way of life of the Ukrainian people. It is famous for its diversity and quality of flavour. Every region of the Ukraine has its own recipes and traditions.

The most popular Ukrainian dish is borscht. This thick and delicious soup is prepared with a variety of ingredients including meat, beans, vegetables, sour cream and even garlic. In Ukraine, people eat borscht with *pampushka*, a bun made with grated garlic.

Holubtsi, or stuffed cabbage, is another favourite dish. *Varenyky*, often mentioned in folk songs, are filled with potatoes, meat, cheese, sauerkraut, or berries.

Ukrainians' dairy products are cottage cheese pancakes and *riazhanka*, fermented baked milk.

There are no holidays without pies, *baba*, which is a tall, cylindrical cake, and honey cakes.

Here's a Ukrainian Recipe from **Jerry Olesnyckyj**, handed down from his mother.

Ukrainian Wild Mushroom Garlic Soup

The mushroom soup recipe needs a pound of wild mushrooms. We used to pick these in the Peterborough forest each year and my mother would sort out all the edible ones and discard the bad ones. One can substitute the fresh wild mushrooms with reconstituted dry wild mushrooms soaked for several hours in water. This is quite expensive, so the second choice is dried Chinese mushrooms reconstituted by soaking in water. These can be bought in bags in Chinese grocery stores. Third choice is to substitute the wild mushrooms with shitake, oyster or portobellow mushrooms.

Ingredients:

1 finely chopped onion
½ pound sliced white mushrooms
¼ pound of garlic cloves peeled and sliced lengthwise
4-5 shallots or green onions finely chopped
¼ cup dill weed leaves, chopped
1 quart water
2 quarts heavy cream or ½ in ½ if you're on a diet
¼ pound of unsalted butter
1 cup of brandy
1 pound of fresh wild mushrooms, sliced stems removed and set aside

Method:

In a large saucepan melt butter on medium heat and add chopped onion, shallots, wild mushroom stems and sliced white mushrooms. Sauté for 45 minutes. Add sliced garlic and brandy and bring to a light boil. Transfer to a 5-quart pot.

Add ½ of the water and bring to a simmer. Simmer for 5:10 minutes. Slowly stir in the heavy cream and simmer for 20 more minutes.

Add more water if necessary to get a desired consistency. Season with salt and pepper to taste. Add the sliced wild mushrooms and simmer for 10-15 minutes. Add chopped dill and simmer for a minute or two more. Season with salt and pepper to taste again and serve.

The Leek Moth - An Introduced Pest of Allium in Eastern Ontario

by Kristen Callow, Vegetable Crop Specialist, OMAF Guelph and Hannah Fraser, Entomology Program Lead, OMAF Vineland

The leek moth, *Acrolepiopsis assectella*, a pest of European origin, was first positively identified in Ontario in 1993. The distribution of the pest includes Asia, Africa, Europe and Canada. The leek moth is considered a serious pest in some parts of Europe, with levels of infestation up to 40%; in other areas (United Kingdom), where generations are limited to 1-2 per year, the pest is sporadic and causes little damage. Surveys conducted in 2001 by the Canadian Food Inspection Agency (CFIA) indicate that the insect is present and established in a localized area in eastern Ontario (National Capital Region Ottawa-Hull); results of the 2002 survey have not yet been published. This represents the first report of leek moth in North America. Surveys indicate the pest is not present in the US, though it is listed as an invasive insect species of concern (visit http://ceris.purdue.edu/napis/pests/ lkmth/imap/usamap.html for US survey information).

Leek is the preferred host of the pest, though other *Allium* crops can be attacked (garlic, elephant garlic, onions, shallots, chives). The larvae tunnel mines in the leaf tissue, sometimes causing distortion, and are reported to occasionally attack the bulb and stems. In garlic, the larvae will attack the scape. Damage to the leaves of leek can make them unmarketable and damage to garlic cloves may predispose them to secondary bacterial or fungal diseases. Symptoms include mining and perforations. Damage is reported as being more prevalent near field perimeters.

The leek moth adult is a small (15mm wingspan) reddish-brown moth with small white triangular markings and small, scattered white spots on the forewings. Eggs are white, 0.4mm in diameter, and difficult to detect. Larvae are yellowish-green with 8 small spots on each segment, and possess a pale brown head capsule. They reach 13-14mm at maturity. The pupa is encased in a loosely netted cocoon which is typically attached to the leaf. Note that the cocoon is similar in size and appearance to that found in other moth pests such as the diamondback moth.

There is little published information regarding the biology of the leek moth in Ontario, though a plant pest information sheet has been published by CFIA (see http://www.inspection.gc.ca/english/ppc/science/pps/datasheets/acrasse.shtml for images of the adult moth and damage symptoms). The insect overwinters as an adult moth in various sheltered areas such as buildings, hedges and plant debris. They emerge in the spring when temperatures reach 9.5 degrees C, and mate shortly thereafter. Eggs are laid singly on lower leaf surfaces whenever night temperatures do not fall below 10-12 degrees C. Females will lay up to 100 eggs during their 3-4 week life span. Larval development from hatching to pupation is 15 days at 25 degrees C. In France, there are 4-6 generations depending on the area. In southern Ontario, it is estimated that 2-3 generations may survive. The established population in the capital region of Ontario appears to be affecting a limited number of organic growers, possibly due to a lack of chemical and effective cultural intervention. Estimates of damage to affected growers in 2002 are not available, but reports indicate the pest did not cause significant economic losses last year. The potential impact of leek moth establishments to growers in other *Allium* production areas is undetermined, but measures to prevent the spread of this insect should be undertaken to avoid losses in other regions of the province.

A pheromone lure for monitoring adult activity is available commercially. At present, there are no registered pest control products in Canada for leek moth. Cultural controls including crop rotation, removal of old and infested leaves, destroying any obvious pupae or larvae and destruction of plant debris following harvest may be effective in reducing populations below damaging levels. German literature suggests covering leeks with netting prior to female activity may reduce damage to leek.

For more information visit the following websites:
http:/!www.inra.fr/InternetlProduits/HYPPZ/RAVAGEUR/6acrass.htm
http://www.pestalert.org/Detail.CFM?recordlD=25
http://www.extento.hawaii.edu/kbaselcrop/Type/acrolepi.htm

Garlick, Allium, dry towards Excess; and tho' both by Spaniards and Italians, and the more Southern People, familiarly eaten, with almost everything, and esteem'd of such singular Vertue to help Concoction, and thought a Charm against all Infection and Poyson (by which it has obtain'd the Name of the Country man's Theriacle) ... we absolutely forbid it entrance into our Salleting, by reason of its intolerable Rankness, and which made it so detested of old; that the eating of it was (as we read) part of the Punishment for such as had committed the horrid'st Crimes. To be sure, 'tis not for Ladies Palats, nor those who court them. farther than to permit a light touch on the dish. with a Clove thereof. much better supply'd by the gentler Roccombo combo.

— John Evelyn, Aceteria (1699)

Book Review

Compendium of Onion and Garlic Diseases

ISBN 0-89054-170-1, The American Phytopathological Society, St. Paul, Minnesota
Edited by Howard F. Schwartz and S. Krishna Mohan
8½ x 11 size, 54 pages, 100 colour plates, 1995

Each year, I get more and more calls from garlic growers concerned with problems in their garlic patch, yellowing and stunting of the plants, diseases and soon. While I don't consider myself an expert on plant diseases or pests, I do try to keep abreast of problems with garlic so I can at least point growers in the right direction.

My old standby reference, *Diseases and Pests of Vegetable Crops in Canada* by the Canadian Phytopathological Society didn't have sufficient information on garlic to answer all the questions.

A reference document search led me to the *Compendium of Onion and Garlic Diseases*, a text in booklet form devoted to diseases of onions and garlic.

The booklet is divided into two parts, the first on diseases and the second on abiotic factors, with a section of colour plates conveniently located in the centre.

The Compendium describes infectious diseases caused by fungi, bacteria, nematodes, viruses, mycoplasma-like organisms and parasitic flowering plants.

Also included is a section on non-infectious diseases caused by abiotic factors such as temperature and moisture stress, pesticides, air pollution mineral deficiencies and toxicities.

It does not deal with insect pests such as the leek moth.

Control measures are practical, providing guidance on both cultural practices suitable for organic growers as well as chemical measures where appropriate.

I found it to be a comprehensive account covering 45 of the most prevalent diseases of garlic and onions, with 100 colour plates, making it an excellent reference for disease identification. I recommend the *Compendium* to garlic growers as a complementary reference the Canadian *Diseases and Pests* publication. However, when you have a problem, to be sure of exactly what you are dealing with, contact your provincial agricultural specialist and get samples to a lab for positive identification.

Note: A new edition of this Compendium will be published in 2008. Used copies of the first edition will become very cheap! (DS)

Garlic Discovers America!

Our two-weeks winter holiday in the sun was to the Dominican Republic, on the island in the Caribbean named Hispaniola by Christopher Columbus.

Now, if you remember your public school history, back in 1492, it was garlic that sailed from Spain on the three ships, Nina, Pinta and Santa Maria, bringing Christopher and his sailors with him to discover the New World!

The menu for Spanish seamen consisted of water, vinegar, wine, olive oil, molasses, cheese, honey, raisins, rice, garlic, almonds, sea biscuits, dried chickpeas, lentils, beans, salted and barrelled sardines, anchovies, dry salt cod and pickled or salted beef and pork meats and salted flour.

This marked the first arrival of cultivated garlic in the New World. Dominican and island cuisine in general has been flavoured with garlic ever since.

Dominicans start their day early with a light breakfast of coffee and warm milk (cafe-con-leche) and a crusty hot bread roll, or more filling one, with mashed plantains (Mango), eggs (omelette), sausage, breads and fresh fruit. The big meal of the day, served between noon and 2 pm is a bountiful spread, typically consisting of large platters of rice and beans, fried plantains, vegetables, stewed chicken or meat, salad, and a strong cup of express.

Dominican dinner is a light meal of fresh fruit, cheeses, boiled or fried plantains, sausage or ham served after seven pm in the cool of the evening.

"HATE TO BREAK IT TO YA ... BUT THE COMPETITION FOR THE BIGGEST GARLIC BULB WAS HELD YESTERDAY"

Extensive Garlic Damage in 2006

by Jennifer Allen, Vegetable Crop Specialist, OMAFRA

Garlic growers across the province are suffering severe losses due to stem and bulb nematode this season. Stem and bulb nematode (also referred to as bulb and stem nematode), *Ditylenchus dipsaci*, was first noted in Ontario in 1957. Although this pest has been recorded for almost 50 years, this is the first year that there have been so many reports of losses in both small and large garlic plantings from the east, north and southwestern areas of the province.

What is the stem and bulb nematode?

This nematode is different from other common nematodes like root-lesion or root knot nematode because it is not confined to the root region of plants. Stem and bulb nematodes can enter seed, invade the basal plate of the bulb, and enter host leaves through stomata or move upwards into leaves through the bulb. A unique characteristic of this nematode is that it's capable of living without water and tolerates desiccation for several years.

The stem and bulb nematode has three life stages: 1) egg, 2) juvenile and 3) adult. The juvenile life stage is broken into four stages, 1st stage larva, 2nd stage larva, and 3rd and 4th stage larva. Only the 4th stage larva is capable of infecting its host.

What does the damage look like?

Depending on when the stem and bulb nematode infects garlic, there can be a variety of symptoms. Early in the season, young seedlings infected with nematodes are often stunted, with chlorisis and bloating of young leaves. Later, infections can cause twisting of new growth, bulb softening and desiccation, loss of roots (Fig. 1), followed by clove destruction (Fig. 2). To see colour photos visit http://apps.omafra.gov.on.ca/scripts/english/crops/agriphone/index.asp, and click on August 14, 2006.

Fig. 1. *Underdeveloped garlic bulb; absence of roots on one side of basal plate indicative of stem and bulb nematode infection.*

Why is this an issue for garlic growers?

Garlic is not planted from true seed. Garlic growers often keep a supply of harvested bulbs, and plant individual cloves from these bulbs in the fall. Therefore, a small infestation can quickly multiply when contaminated cloves are replanted. Unfortunately, with a microscopic pest like the stem and bulb nematode, even plants that appear perfectly healthy when they go into storage may harbour some parasitic nematodes. If you think you have stem and bulb nematode it is important to have both your soil and garlic tested.

Fig. 2. *Rotting of basal plate due to stem and bulb nematode infection.*

Stem and Bulb Nematode Continues to Damage Garlic in 2006

by Jennifer Allen, Vegetable Crop Specialist, OMAFRA

As was to be expected, I received numerous calls and samples from garlic growers this season that suffered losses due to the stem and bulb nematode (for more information on what the stem and bulb nematode is, check out my article on this page).

Unfortunately, most of the garlic growers didn't know they had a problem until the end of the season when they started harvesting their bulbs. Traditionally, it's been recommended that you look for stunted young plants or plants displaying chlorosis or bloating. Since most of the growers I've dealt with didn't see any of these above ground symptoms, I think it's time we rethink how to look for this pest.

Based on my experience, soil and bulb testing is really the only way to know whether or not you have this pest. Soil sampling should be done in early summer and early fall. In general, nematode populations tend to peak in May-June and September-October. The tools you'll need include a soil core probe or a narrow-bladed shovel, and a bucket. Once you have these tools, you're ready to begin.

The basic soil sampling recommendation is that you sample a number of locations (see Chart below) within your field. From each sample site, go down at least 8" deep, knocking off the fist 2" and mixing the remaining 6" in your bucket. Once you've finished sampling, you need to take a sub sample, generally a cup or two of soil, place it in a sealable container (plastic bag, plastic dish) and then send it off to the lab for analysis.

Number of soil core samples/area required for estimating nematode populations:

Area	**Number of soil cores/sample**
$<500m^2$	8 - 10
500 m^2 - 0.5 ha	25 - 35
0.5 ha - 2.5 ha	50 - 60

For bulb analysis, either you can submit samples from actively growing plants or you can wait and send samples once harvested. In either case, simply pick out some healthy and non-healthy bulbs, place them in a sealable container, and send them off to the lab for analysis.

Remember, there really isn't a reason not to test. If your soil or bulbs test positive, you're ahead of the game. You can now work on controlling and eliminating the pest from your field. If your samples test negative, then you know you have pest-free stock and can continue to monitor and prevent a problem from developing.

The Challenge of Nematodes

By: Marilyn H. S. Light

In response to some questions posed by Paul Pospisil, I conducted a literature review and learned some things that hopefully will help those experimenting with nematode control methods. I am not a seasoned garlic grower but I do have an interest and some experience with soil nematodes such as *Ditylenchus dipsaci*. This is a challenging pest and very persistent by all accounts, but it does have some vulnerabilities which growers can exploit to advantage.

Paul asked about marigold cultivars: Were there any cultivars known to be better at nematode suppression? The answer is YES. I located two articles that deal with various cultivars of marigold. The following website provided more useful information including some thoughtful discussion on the limitations of marigold as a nematode suppressant. *"Marigolds as a cover crop" K E. Dover, K McSorley, K -H Wang, 2003. http://agroecology.fas.ufi.edu/marigolds background.htm*

Given the limitations presented in the above, I looked further and found a 1995 Chilean paper that detailed an effective organic method to destroy the nematode on garlic cloves prior to planting. Given how the garlic nematode can be introduced into gardens, clove pre-treatment is a must. If you were not already doing so, I would immediately add pre-treatment of all seed stock prior to planting anywhere. There are techniques employing hot water or hot water/formalin treatment but the Chilean method employs fresh leaves of the common lawn weed, Plantain *(Plantago major)* that many still try to eradicate from lawns! I feel that this is certainly worth a try if even on an experimental basis. Plantain is easily found and harvested.

Grind up 100 g of fresh chopped Plantain leaf in I litre of water. Filter and use immediately if possible otherwise freeze then thaw before use. Immerse cloves in the solution for 24 hours before planting. Do not rinse before planting. Those interested in experimenting could compare the results using this method to any other pre-treatment method currently in use and report their findings.

Crop rotation is useful in controlling many plant pests and diseases. In the case of garlic, I feel that a 3-phase rotation may be better than marigold inter-planting at least until you can consistently show no *Ditylenchus* nematode present in your ground. Such a rotation would employ fallow with solarization, followed by dense marigold planting, followed by garlic planting. Your garlic would not be competing with marigold and therefore yields would be less likely affected.

According to various sources, *Ditylenchus* life cycle is 19- 23 days at 15°C, a soil temperature usually achieved by late May to early June in eastern Ontario. These nematodes live 45-75 days when sexually mature. Without host plants such as garlic, they can survive up to 2 years.

Fourth-stage juveniles can enter a survival stage. These dormant juveniles can survive in dry plant material/soil for 3 to 5 years. When soil warms in spring, juvenile nematodes break dormancy and enter plants below the soil surface. Migration on plant parts above ground requires free water, and may occur after rain or sprinkler irrigation. Cool moist conditions favour the spread of this pest, as does clay or poorly drained soil. Dormant larvae can persist for many years so eradication of the pest will take many years. From what Paul told me, I believe that he has evidence that marigolds reduce the nematode numbers *but marigolds could compete with the crop for nutrients*. We cannot know if nematode numbers have been reduced because of interference of marigold on nematode reproduction or simply because the nematodes were suppressed from breaking dormancy while marigolds were present. There seems to be a lot of controversy over the mode of marigold action but this may be because modes of action vary according to the kind of nematode present.

There is some evidence to suggest that a leaf extract of marigold may be effective against nematodes. This approach is worthwhile trying and would take care of the challenge of growing marigolds in early spring when they are still frost susceptible but garlic is growing or later, when inter-planting creates competition for nutrients. We could experiment with a fresh marigold extract that can be frozen for use in spring. Apply the extract to garlic just before the soil temperature in the garlic root zone approaches 15°C, then weekly thereafter until marigolds can be inter-planted. It also may be worthwhile to plant dense strips of marigold across the field in the direction of runoff. This would capture any migrating nematodes and further reduce the population.

Suggested Internet links:

Greenhouse studies of the effect of Marigold (*Tagetes .spp.*) on four root-knot nematode species (*Meliodogyne spp.*). Antoon T. Ploeg, Slosson Report 98-99, 1-6. *http.//ucce.ucdavis.edu/freeform/slosson/documents/1998-19992096.pdf*

Soil Solarization: *http://vric.ucdavis.edu/veginfo/topics/soils/soilsolarization.pdf*

Disinfection Alternatives for Control of *Ditylenchus dipsaci* in Garlic Seed Cloves. P. A. Roberts and W. C. Matthews. 1995. Journal of Nematology 27: 448-456 *http://fulltext1O.fcla.edu /DLData/SN/SN0022300X/0027004/9557.pdf*

Control of *Ditylenchus dipsaci* on Garlic (*Allium sativum*) with Extracts of Medicinal Plants from Chile. lnsunza B., V.; Valenzuela A., A. 1995. Nematropica 25:3 5, 41. *http:// fulltext10.fcla.edu/DLData/SN/SN00995444/002500_001 /OOPO184X*

Tip Burn in Garlic

by Jennifer Allen, Vegetable Crop Specialist, OMAFRA

This season many garlic growers have been experiencing yellowing and dieback of leaves and have wondered what's causing this to happen?

Tip yellowing and dieback in alliums, including onions, garlic, chives and shallots, can be caused by abiotic factors such as plant overcrowding, drought, salt stress, wind desiccation and occasionally ozone damage. As well, these symptoms can be caused by a biotic factor such as Fusarium basal plate rot. The organism responsible for Fusarium basal plate rot is *Fusarium oxysporum cepae*.

This mould is a soil organism that is capable of surviving for long periods of time. The fungus can enter healthy bulbs directly, or through new or old wounds such as those caused by insects, pink root infection, or cultivation injury. Spread occurs season to season through infected soil or via contaminated sets or cloves. Within infected fields, affected plants can be either localized or scattered throughout the field. Although it is not believed that bulb-to-bulb movement in storage is significant, this may be a concern for garlic growers who store bulbs for garlic seed stock.

Roots and basal plates can be infected at any age. Symptoms include a gradual yellowing and dieback of leaves. When infected plants are pulled the roots are pinkish-brown and if cut vertically, a discolouration of the plate is evident. Optimum disease development occurs in wet soils when soil temperatures reach 25 to 28°C.

Unfortunately, once a field is infected there is no curative measure that can be taken. Infested plants should be removed from the field and destroyed. Preventative control measures that can be taken to help reduce the risk of this disease next year include:

- Crop rotation to non-susceptible crops (non Alliums) for 3 to 4 years.
- Plant in well-drained soil, preferably on a raised bed.
- Soil fumigation.
- Manage soil insects (e.g. onion maggot) to reduce potential entry points.
- Dip seedlings and cloves in fungicide before transplant.
- Plant resistant onion varieties and/or disease-free garlic cloves or bulbils.

Basal rot of garlic
caused by Fusarium

This disease is controlled by proper crop rotation with non-susceptible crops for four years, removal of infected plants, and planting disease-free seed.

Many Queries —

We received a lot of calls this year from growers concerned about both tip burn and mortality of garlic plants before they were ready to harvest. Copied below is an interim reply typical of the ones I gave to growers' queries while waiting for replies from government specialists (I had too many reports to publish all the different grower observations).

Hi David,

Just a follow up to your query. We did our usual pre-harvest check in the Trials Plot and removed yellowed plants. It would seem that the % of plants affected is higher this year, likely due to the heavy rains earlier in the year followed by very hot weather, ideal conditions for Fusarium basal plate rot to develop. I've copied the description from the OMAF paper for you. The US Compendium of Onion and Garlic Diseases doesn't throw any more light on it. Since the disease is carried in the soil, crop rotation and using good seed helps, but there is no fast cure for the problem.

You'll find that you'll be able to salvage many of the diseased ones for table use — BUT, DON'T plant any that show even a bit of root decay or discolouration as there is a risk of some of the soil on the bulb spreading to your new planting!

Rotation, giving the soil 3 or 4 years with no alliums, seems to be the best answer to cleaning up the soil.

I'm getting more reports, so it appears that the hot summer seems to be the main culprit. And, yes, it appears that Porcelains are affected more than other Varietal groups.

Paul Pospisil

At first, the problem appeared to be only fusarium triggered by a very hot summer following a wet season. However, later information indicated that it could have been either fusarium or the bulb & stem nematode as the physical symptoms from these are very similar.

The articles by Jennifer Allen (opposite) and Michael Celetti (elsewhere in this issue) are intended to provide growers with an early "heads up" on these two potential problems in garlic fields.

I will be following up next year with the growers who reported problems. Early examination of samples by a lab gives you a better chance of minimizing future crop loss and starting to take corrective action.

Basal Rot

from Manitoba Website

This soil-borne Fusarium disease prefers warm soil temperatures and is common in Manitoba. Early symptoms include yellowing and tip dieback. As the disease progresses, the plant will collapse, the roots will decay and the basal plate will have a pinkish colour. Secondary rots often follow. Crop rotation and the use of disease-free transplants are recommended.

Managing the Bulb and Stem Nematode Menace in Garlic

Michael Celetti, Plant Pathologist, Horticulture Crops OMAFRA, Guelph, Ontario

The Bulb and stem nematode (*Ditylenchus dipsacci*) is a microscopic worm like organism that can be a very destructive pest of garlic, onion, leak as well as many other host crops. Unfortunately, this pest has been spreading recently on garlic cloves used for seed. Regardless of the crop being grown, the bulb and stem nematode has the potential of causing complete crop failure. The nematodes can spread through irrigation water, in infected bulbs or cloves as well as on contaminated equipment, footwear and clothing.

The bulb and stem nematode survive freezing or extremely dry conditions in a dormant state in infested plant debris, infested soil and between the scales of infested bulbs of Allium crops (onion, leaks, shallots, garlic). Under wet conditions the nematodes become active and swim in the film of water in soil or on wet plant surfaces. They feed on leaves and bulbs but rarely roots by piercing plant cells with their stylet or hypodermic needle-like mouthpart. During feeding, they inject saliva containing an enzyme into the cells, which can cause distorted growth of the tissue. Leaves of severely infected plants turn yellow and dry prematurely resulting in stunted plants. Once the nematodes have caused initial damage to the growing garlic plant, hot dry weather will often exacerbate symptoms even though this type of weather does not favour the spread or activity of the pests. Other fungi and bacteria often enter wounded bulbs and cause further degradation. Infested garlic bulbs tend to be soft, shrivelled, discoloured and lighter in weight. The basal plate and roots of severely infested bulbs may also appear to have a dry rot and can be easily separated from the bulbs, mimicking symptoms of Fusarium basal plate rot.

Bulb and stem nematodes prefer wet soils and are not likely to cause damage during hot dry seasons unless the fields are over- irrigated or heavily infested seed was planted. Prolonged periods of rain and cool temperatures tend to favour the activity, spread and reproduction of this pest, such as the weather conditions experienced last year in 2004. These nematodes complete their life cycle within 19 to 23 days under optimum conditions and during this time a single female can lay up to 500 eggs. Several generations can occur over one growing season resulting in a rapid and dramatic population explosion. Although it was very hot and dry in many areas of Ontario this past season, the increase in infested garlic gloves planted from last years crop in the fall of 2004 impacted many garlic growers this year. The impact of this pest on the 2005 garlic crop would have been worse if the weather remained wet and cool again this year.

Often slightly infested cloves used for seed do not show any symptoms although the presence of nematodes can be detected by examining tissue under a microscope. Using garlic from contaminated fields as seed will most likely result in the introduction of this nematode into clean fields or further spread of this pest. Obtaining and planting nematode free seed from a reputable seed supplier is the best way to prevent further spread of this pest. However, hot water treatment of garlic bulbs used for seed has been shown to be an effective method for reducing and in some cases completely eliminating the nematode from seed. This technique is only effective when the thermal tolerance of the nematode is less than that of the plant material. Temperatures above 50°C may injure the garlic cloves resulting in poor germination and establishment, while temperatures less than 44°C for 1 hour may not kill all the nematodes. For best results:

1. Select only healthy disease free bulbs for hot water treatment and planting. Unhealthy bulbs may not survive the hot water treatment, which could lead to poor germination and establishment.
2. It is recommended to pre-soak the bulbs in 0.1% detergent and water solution for about 1 hour at room temperatures before dipping them into the hot water bath.
3. Remove the bulbs from the detergent solution and submerge them immediately into the hot water bath maintained at 44°C for 1 hour ensuring that all bulbs are completely submerged.
4. After one hour, remove the bulbs and submerge them in a cool water bath for another 15 minutes or until the bulbs have cooled down completely.
5. Remove the bulbs and spread them on a clean surface to dry.

As well as planting clean seed, implementing a 3-year crop rotation with a non-host crop; burying or burning infested or contaminated seed and plant debris are also necessary to reduce reintroduction and spread of this pest. Cleaning soil and debris off of equipment footwear and or clothing before moving between fields and cleaning debris from storage areas will also help reduce the potential spread of this pathogenic nematode. Selecting fields that have been tested for bulb and stem nematode and determined to be nematode free is also important to ensure that the crop being planted will not be infested by soil borne nematodes. Soil should be sampled and sent to a Pest Diagnostic Clinic qualified to extract, identify and enumerate nematode population levels, well before the crop is planted so that appropriate actions can be made. Fumigating soil in conventional agriculture production systems with a registered soil fumigant late in the summer or early in the fall before planting will also reduce the potential of severe losses and further spread of the bulb and stem nematode.

Editors Note: If your soil is infested take corrective measures to minimize spread and crop loss. Growers concerned about infestation would be well advised to have their samples checked by a plant lab. A fee applies.

Garlic Diseases - Recognizing the Problem

At the 1996 Vegetable Crops Conference in Toronto, Dr. Ron Brammall of the Simcoe Research Station gave a talk on some of the shortcomings of the fledgling garlic industry in southwestern Ontario. Emphasis on marketing rather than good farming practice had driven growers to scale up production only to realize disappointment.

He stated, "In the spring of 1987, the Ontario crop was all but lost. For most growers, the plants emerged in March to April and grew only a few centimetres. The plants then very rapidly died... Similar losses were seen in 1988."

The loss was attributed to "winterkill." However, when the plants were examined in the lab, they were infected with *penicillium hirsutum*, or Green Mould disease.

Why did this occur? Dr. Brammall laid the fault on the mechanical "cracking" devices being used by growers to speed up the planting process. The cracking machines damaged the protective clove wrappers, allowing the *penicillium* spores to infect the cloves.

Dr, Brammall's research also indicated that the spores, imported on infected garlic from California, were already resistant to known chemical controls used there. He concluded that chemical treatment was unnecessary if the seed cloves were undamaged by careful "cracking."

Good farming practice is essential to successful agriculture. Reliance solely on chemicals doesn't necessarily work.

A similar situation exists in the case of viral diseases of garlic. While research labs such as Becky Hughes "Clean seed project" at the SPUD research centre in New Liskeard can provide growers with disease-free seed stock, the onus remains with the growers to use good farming practices so as not to re-infect the clean seed. See next article as it refers to aphids spreading the viruses.

Garlic Viruses and the Ontario Industry

by Dr. Lorne Stobbs, AAFC Research Scientist, November 1999 (Reprinted from the Garlic Press with permission).

A two-year study was recently conducted by the Southern Crop Protection and Food Research Centre (SCPFRC) of Agriculture and Agri-Food Canada (AAFC) to assess the incidence of virus diseases in the garlic industry in southern Ontario.

Thirty-one commercial garlic growers were surveyed, with 13 varieties tested. These included: Chinese Softneck, German Hardneck, German White, Italian Red, Italian Softneck, Legacy, Lucie Anne Hardneck, Music, Nellie, Polish Gen, Polish Hardneck, Polish Softneck, and Siberian, although most growers were growing Music exclusively.

Garlic samples taken from all sites were infected with garlic latent virus (GLV), averaging 62 per cent overall infection. Infected plants exhibited mild yellow streaking & mottling. Symptoms were less noticeable or absent by mid-July. Onion yellow dwarf virus (OYDV) was found at 93 per cent of the sites, and was present in approximately 38 per cent of the plants at each farm. Infected plants exhibited mild mottle or were non-symptomatic.

Leek yellow strip virus (LYSV) was present at 85 per cent of the sites, averaging 12 per cent infection.

In garlic, the viruses are seed-borne. Since most of the seed planted by growers was either obtained from their previous crop or from local suppliers, the high levels of field infection are not unexpected. Further spread of the viruses occurs as aphid populations rise in the field, with many fields approaching 100 per cent infection by harvest.

GLV and LYSV were transmitted by the green peach aphid from garlic to garlic, leeks, and onion. OYDV was similarly transmitted to garlic and onion. While the symptoms of OYDV infection were mild to negligible in garlic, the virus caused severe yellow striping, leaf curling, and stunting in onion.

No statistical differences in percentage infection were seen among the various varieties infected with any of the viruses.

Many of the plants were infected with more than one virus.

By mid-July, the viruses were widespread in the fields, and the presence of the *green peach-aphid*, a known vector of GLV, LYSV, and OYDV, was likely associated with horizontal field transmission. The presence of OYDV in garlic could seriously impact onion production if infected garlic was introduced into onion production areas.

Since a source of clean seed is not currently available to garlic growers, it is likely that these viruses will continue to spread and increase within the Ontario industry.

The widespread distribution of viruses within the garlic industry is cause for concern. Yield reductions in excess of 25 per cent have been attributed to GLV, LYSV, and/or OYDV infection. With increased public focus on the medicinal properties of garlic, the acreage of this crop across Canada has rapidly increased. Local suppliers, with no assurances that the seed is free from viruses, have met demand for seed.

Efforts need to be made by the industry to develop a clean seed program to ensure the health of an expanding industry.

Why do banks charge a fee on "insufficient funds" when they know there is not enough money in your account to pay it?

Organic Sources of Nitrogen Supplements for Garlic

By Ken Willis, N.P.D

Supplemental fertilization of the garlic plant with a source of nitrogen can help to increase bulb size and quality, thereby increasing yield. Nitrogen is essential for the green growth stage of garlic, producing healthy, vigorous leaf and stem tissues. However, the misuse of nitrogen can seriously decrease quality by increasing the incidence of penicillium mould (*Penicillium corymbiferum*) and decrease storage time. With the exception of extremely poor soils with low levels of fertility, the use of other plant nutrient fertilizer such as potassium or phosphorous will produce little effect on garlic yield.

Conventional chemical farmers will use a source of nitrogen called 33-0-0 (ammonium nitrate). It is applied at three-week intervals starting at the 2-3-leaf stage after emergence in early spring, at a rate of 37 kg/ha or 33 lbs/acre. This method of fertilization is very fast acting as the nitrogen is water-soluble and translocates to the garlic plant readily. Over-use of this fertilizer results in an increased incidence of penicillium mould.

Ammonium Nitrate is a prohibited substance for organic growers.

The availability of an adequate supply of nitrogen can be a difficult practice to manage for organic growers. With the addition of soil amendments such as manure, cover crop plowdowns or mulch material, you can greatly reduce the need for additional sources of nitrogen. Well-balanced soils with high organic matter content may in fact require no additional nitrogen supplementation. For the purpose of this article. I will not discuss building soil fertility and the following is a discussion on nitrogen sources as supplements.

The old time standby of organic nitrogen fertilizer for garlic was blood meal. Blood meal is applied in the fall just prior to planting time and has an analysis of 12-0-0. Due to the issue of mad-cow disease, it is now not allowed in certified organic production.

Alfalfa hay is a great source of nitrogen for garlic. As quality of the hay varies, there is no way of predicting the nitrogen analysis. It should be applied in August before October planting at a depth of 1 or 2 inches and incorporated into the soil. In dry years, watering will help to break down alfalfa to prepare for planting time.

Alfalfa is a major ingredient in organic, commercially available fertilizer blends now available for purchase in bags at garden supply outlets. These blends may contain many other ingredients, such as corn gluten, rock phosphate and greensand, therefore supplying various plant nutrients. It is very much “buyer beware” with these products and you should check for the OMRI-approved sticker before purchasing. Follow directions on the label.

Organic fertilizer blends generally contain an analysis with a low percentage of nitrogen, usually below 5%.

A low analysis nitrogen fertilizer helps prevent the penicillium mould and problems from nitrogen overuse.

The slow-release property of a nitrogen source is an important factor because nitrogen must bind with organic matter content in the soil or it will leach out into groundwater or volatilize into the atmosphere.

Crab shell meal will supply nitrogen very slowly to the garlic plant as the shells take a long time to break down. It should be incorporated prior to planting in the fall at a rate of 112 kgs/ha or 100 lbs/acre*. With an analysis of 3-3-1, crab shell meal will also supply a balance of micronutrients. The main drawback to using crab shell meal is it is expensive.

For those who have a readily available source of quality compost, the use of compost tea as a soil drench is the best overall choice in supplying nitrogen as it is economical, clean and provides a readily available form of nitrogen, which is utilized by the plant immediately. Compost tea should be applied in the early spring starting at the 2-3-leaf stage and repeated at three-week intervals for a total of three applications.

The last type of nitrogen fertilizers useful for garlic growing are the commercially available, water-soluble fertilizers made from seaweed, kelp or fish. These products are offered in many formulations and supply varying degrees of nitrogen. They are diluted with water and utilized in the same method as compost tea. Always follow directions on the label. I recommend the hydrolyzed fish and kelp formulations of these products.

For certified organic growers, be sure the product is approved for use. Avoid fish emulsion formulations from farmed fish as they may contain antibiotic residues.

To grow great garlic, it is important to start with building a well-balanced soil. However, considering the factors of time of application, water solubility and low rates of application, those who are looking to add a source of nitrogen will improve the yield and quality of the garlic harvest.

Note: multiply lbs per acre by .04 to get lbs per 100 square foot.

Average Nutrient Concentrations And Rates Of Availability For Various Organic Materials

Material	% Nitrogen	% Phosphate	% Potash	% Availability*	Notes**
Alfalfa hay	2-3	-0.5	1-2	slow/mod.	
Bone Meal	1-6	11-30	0	Moderate	alkaline
Blood meal	12	1-2	0-1	rapid	acidic
Cottonseed meal	6	3	1	slow	acidic
Composts	1-3	1-2	1-2	moderate	alkaline
Feather meal	12	0	0	moderate	
Fish meal	6-12	3-7	2-5	rapid	acidic
Grass clippings	1-2	-0.5	1-2	moderate	
Hoof/horn meal	12-14	-0.5	0	moderate	alkaline
Kelp	-0.5	-0.5	5-10	moderate	zinc, iron
Leaves	1	-0.5	-0.5	Slow	
Legumes	2-4	-0.5	2-3	moderate	
Manures: Cattle	2-3	-0.5	1-2	moderate	weed seed
Horse	1-2	-0.5	1-2	slow	weed seed
Swine	2-3	-0.5	1-2	rapid	
Poultry	3-4	1-2	1-2	rapid	
Sheep	3-4	-0.5	2-3	moderate	weed seed
Pine needles	0.5	0	1	slow	acidic
Sawdust	0-1	-0.5	0-1	very slow	
Sewage sludge	2-6	1-4	0-1	moderate	zinc, iron
Seaweed extract	1	2	5	rapid	zinc, iron
Straw/corn stalks	-0.5	-0.5	1	very slow	
Wood ashes	0	1-2	3-7	rapid	

* Approximate rate of nutrient release from the material.
** Special properties or characteristics of the material.

Liquid and foliar fertilizer applications can be made with water-soluble products like fish emulsion or seaweed extract. There is a potential for leaf-burning with liquid applications, so follow product label instructions carefully. Manure or compost tea can also be used as a source of liquid fertilizer. Partially fill a burlap or cloth bag with manure or compost and submerge for several days in a bucket of warm water. The resulting “tea” can be applied directly to the soil or foliage of plants.

Garlick With a K: Early 1800s Garlic Growing

By Ken Willis

The first half of the nineteenth century is the beginning of the end for the world of gardening and agriculture as practiced by the land holding gentry, the hardworking farmer or the professional horticulturist of those times. Before science transformed each of these disciplines into the forerunners of their modem versions today, the information and knowledge on the cultivation of garlic was limited in the English-speaking world, at least in the popular press.

Without copyright laws, it was common practice to plagiarize or even blatantly reprint material for publication. Therefore, when examining the garden/farm books and magazines from the 1800s, the sections on garlic usually contain much the same information. The information presented was also usually of British origin, which continued on as a general problem in Canadian gardening until roughly the 1970s.

If you were a garlick grower from this time period, the following is typical of what was available as a how-to on growing techniques, in both content and extent:

Soil: capable in almost any soil

Propagation: generally by parting the root, but may be raised from the bulbs produced on the stems

Planting time: any time in February, March or early April

Method: a single clove to be placed in each one of holes made six Inches apart and one and a half deep, in straight lines six inches distant from each other.

Care is taken to set the foot downwards: to do this It is the best practice to thrust the finger and thumb, holding a clove between them; to the requisite depth without any previous hole being made.

Cultivation: keep clear of weeds. In June the leaves to be tied in knots to prevent their running to seed, which would greatly diminish the size of the bulbs. A few roots may be taken up as required in June and July, but the whole must not be lifted until the leaves wither, which occurs in July or August. It is usual to leave a part of the stalk attached, by which they are tied into bundles, being previously well dried for keeping during the winter.

There is one other major theme present when looking at the history of garlic from this time period. An example of this appears in the book The Victorian Kitchen Garden from 1887 which states: "thought that garlic might not have been grown, particularly during the first part of the nineteenth century, owing to the anti-French feeling at the time."

The prevalence of garlic use among English speaking people was very low, as a direct result of the racist nature of societies at that time. The reputation of the vile pungency of garlic, that lingers even to this day, has its roots in the aftermath of hard feelings from armed conflicts such as the Napoleonic Wars. This aspect of garlic is made perfectly clear in the sole paragraph dedicated to garlic in The American Gardener from 1829: "Almost all nations except the English, the Americans and the French, make great and constant use of garlick, and, even the French use it frequently to an extent that would drive us from the table."

The unusual journey to popularity that garlic was to achieve by the later years of the twentieth century with the appearance of Italian-American fast food such as pizza and spaghetti is even more peculiar with the knowledge that the French and Italians were relatively light consumers of garlic, as compared to the heavy consumers of East European descent, the Poles, Germans and Russians.

Further reading:
The Victorian Kitchen Garden, Jennifer Davies, BBC Books an excellent story of the restoration of a walled kitchen garden, also a television series of the same name
A Dictionary of Modern Gardening, G. W. Johnson, 1847 The American Gardener, William Cobbett, 1829 are reprinted in online form, available on the web.

Your health: vegetables and herbs stored in oil

Taken from Canadian Food Inspection Agency Fact Sheet

Various foods are sometimes stored in oil to extend their shelf life and/or flavour the oil. Examples include garlic, onions, sun-dried tomatoes, hot peppers, and mushrooms. These products are popular home-prepared food items and in some cases, are also prepared commercially. Incidents of food-related illness in Canada and elsewhere in recent years have increased the concern over the safety of such foods, when stored in oil.

Why do these products present a health risk?

These products can present a health risk if stored improperly. If they contain *Clostridium botulinum* bacteria and are bottled and covered with oil, the conditions could be ripe for bacterial growth and toxin production. While refrigeration will slow down the growth of the bacteria, it may not prevent toxin production. Consuming products that contain these toxins can cause botulism, a potentially fatal food-related illness. This can happen without evidence of spoilage such as odour, taste or appearance.

What are the symptoms of botulism?

Symptoms may include dizziness, blurred or double vision, difficulty in swallowing, breathing and speaking, and progressive paralysis. The onset of symptoms takes approximately 12-36 hours and the duration may be 1-10 days although some symptoms may linger much longer. Botulism can be fatal and can cause permanent neurological damage in those who survive.

What should consumers do to protect themselves?

Home-prepared products stored in oil should be made using only fresh ingredients, and must be kept in the refrigerator and discarded after one week. Consumers who purchase home-prepared food products in oil from fairs, farmer's markets or roadside stands or receive them as a gift should check when they were prepared and discard them if more than a week old.

A Note from the Garlic Guru: Looking for a safer way to hold your own garlic cloves in oil? Experts suggest the following:
After peeling the cloves, soak them in household vinegar overnight. Vinegar, an acid; kills the Clostridium botulinum bacteria, reducing the botulism risk. Drain and put cloves in olive oil. Refrigerate. Don't prepare any more than you will use in a week or two. Garlic is a vegetable with a limited refrigerator life. Most of your garlic should be held as cured bulbs in a cool, dry location. The taste of garlic, freshly prepared, is much better than refrigerated garlic.

True Seeds in Garlic

by Dr. Rina Kamenetsky

Although today garlic is known only as a cultivated plant, scientists believe that its wild relatives were widely dispersed in Central Asia about 10,000 years ago. At that time, wild garlic formed small bulbs and flowers, and was probably propagated by seeds. Semi-nomadic tribes cultivated this plant as food condiment and medicinal plant. From Central Asia garlic was introduced to the Mediterranean basin, India and China.

There is evidence that garlic has been in use in China and India for more than 5,000 years and in Egypt since before 2,000 BCE. European traders facilitated its further distribution, and, from the Mediterranean region, garlic was introduced to sub-Saharan Africa and to the Americas by explorers and colonists.

During its cultivation history, garlic was adapted to various climates and selected for cold resistance, bigger bulbs, or higher pungency. In order to obtain a larger bulb, flower stalks were often removed or clones with reduced flowering potential were selected. Thus, the thousands of years of active selection by man resulted in the loss of garlic fertility, and today garlic varieties are completely sterile and are propagated only vegetatively. In modern garlic varieties, the presence of vegetative topsets (bulblets), which develop in garlic inflorescence, is one of the major causes of the inability of this plant to develop normal flowers and true seeds.

The sexual sterility of garlic markedly reduces its potential for the improvement of its economically important traits, including pest resistance, yield, and quality. Restoring fertility in this crop would provide new genetic combinations for breeding purposes or genetic studies. This consideration has stimulated attempts by many researchers to restore fertility to garlic.

In the early 1980s, Japanese researcher T. Etoh made several expeditions to Soviet Central Asia, and collected a number of garlic bulbs. The collected clones were then grown in Kagoshima, Japan, and following topset removal, 17 clones developed fertile flowers with over 3,000 viable seeds. Later, fertile garlic clones were also found in Armenia, Georgia and Sin-Kiang in China. However, seed germination rates were low, ranging between 10 and 12%. Later, in the 1990s, M. Jenderek from a private company in California obtained a large amount of garlic seeds from the plants originating in Central Asia. Removal of topsets was necessary only in the early generations, as the strong selection pressure for blooming and seed production resulted in improved seed set, Recently, 36 fertile accessions were also identified in two USA garlic collections.

In 1998, a special project for restoring the fertility of garlic was initiated in Israel. This project is a part of a large European Community program called "Garlic and Health," which is aimed at the development of high quality garlic and the study of its influence on human diseases. In the framework of this project, our collection missions to Central Asia have gathered over 300 garlic genotypes from locally cultivated or natural populations in Uzbekistan, Tadjikistan, Kirgizistan, and Kazakhstan. This region is recognized as the primary centre of origin of garlic and the main and richest source for genetic diversity, worldwide. The collected clones were evaluated in Israel for their potential fertility and other useful traits.

It was found that following stalk elongation, flower differentiation, pollination, and fertilization, true garlic seeds might be obtained in more than 30 clones. In seven of the most fertile accessions, about 400-500 seeds were produced per umbel, without the removal of topsets. Germination rates reached about 90%, and the seedlings developed into young plants with two to five leaves. At the end of the season, single-clove bulbs with white, purple, gray and brown skins, differing in bulbing ability and ripening, were obtained. These plants vary widely in their physiological and horticultural characteristics, and probably contain most of the worldwide variability of the garlic gene pool.

Physiological studies of the flowering process in garlic show that storage and growth temperatures play the most important role in garlic flower development, and provide environmental tools for flowering regulation and fertility restoration. Short days during the garlic's growth result in flower development, while long days facilitate bulb and topset formation. In bolting garlic genotypes, manipulation of the environment, both before and after planting, can regulate the development of flowers and regain fertility.

Seed propagation of garlic on a massive scale may become a feasible option in the future. Sexual reproduction can be exploited in plant breeding, for improvements to yield, disease resistance, tolerance to stresses, and quality. In addition, in established varieties, seeds (which normally do not transmit viruses) may be used for the production of virus-free propagation material.

Dr. Rina Kamenetsky was born and educated in Kazakhstan (Central Asia). She now works at the Department of Ornamental Horticulture of the Volcani Center, Israel. Her scientific studies focus on the physiology of flowering and dormancy in bulbous species - garlic, shallot, as well as flower bulbs of tulips, narcissus and ornamental onions. In addition, Dr. Kamenetsky's scientific interests are in the field of biodiversity and ecology of herbaceous plants and their evaluation for desirable economic trails. Now on sabbatical leave at: Dept. of Plant Agriculture, University of Guelph, Guelph, Ontario, CANADA, N1G 2W1 Phone 1-519-824-4120, ext 52510 (office) E-mail: rkamenet@ uoguelph.ca

No Fail Salad Dressing

***Ingredients*:**
1 tbsp. Lemon juice, or vinegar
1 tsp. Salt (we use sea salt from Brittany, the best)
1/4 tsp. White or cayenne pepper
1/4 tsp. Basil, oregano, and dill
1/4 tsp. Dry mustard
Dash of Worcestershire sauce
4 cloves garlic minced
1 tbsp. Mayonnaise
1 tbsp. Parmesan cheese
3 tbsp. Oil (olive, canola, or light veg.)

Method:
In a jar with lid, combine all ingredients except oil. Shake well. Add oil last and shake again. To make dressing creamier, add more mayonnaise; to make dressing tangier, add more Parmesan cheese. If you find it too thick, add a tablespoon of water. Enjoy!

Refrigerator Garlic Pickles

Cooking garlic softens the harshness of raw cloves, but use great care not to burn it. This can be done in preparation for pickling as well. Here is a variation of a refrigerator pickle using garlic fresh from the garden.

Ingredients:
2 Tablespoons white vinegar
3 Tablespoons water
1 Teaspoon sugar
½ teaspoon pickling spices
2 bulbs of garlic, separated into unpeeled cloves

Method:
Combine the vinegar, water, sugar and pickling spices in a small saucepan. Bring to a boil over medium heat. Set aside to cool. In another small pan, cover garlic cloves with water and boil for about five minutes. Remove from heat and cool. Peel each clove and place into a clean half-pint jar. Pour reserved liquid over garlic in jar. Place into refrigerator for at least a week before eating.

Bruschetta!

When we are going to the restaurant, very often we order "BRUSCHETTA" (pronounced, brusketta *e non* bruscetta). Have you ever asked how it is made or how it should be made?

Bruschetta came from the term of "rubbing." In fact, to make the real bruschetta, we have to toast in the oven some baghette sliced bread (or any other sliced bread, even stale) until crispy. RUB THE BREAD WITH A CLOVE OF FRESH GARLIC! This is very important! Then, and only then, top it with some diced fresh tomato, season it with fresh basil, a touch of oregano, salt, pepper, and OLIVE OIL.

To prepare the topping, dice the tomato, put it in a bowl, add salt, let it stand for 10-15 minutes, remove the water that eventually forms, then add pepper, seasoning and olive oil. If you want, you can top it with Parmesan cheese and put it back into the oven at broil for a few minutes so that the Parmesan will melt slightly. The toasted bread acts like "sand paper" allowing us to rub the garlic on it once ready. It can be topped with salmon, pates, cheeses, or anything you can think of.

Remember to always rub the fresh garlic clove on the toasted bread. The fresher the garlic, the more juice there is in it!

When was garlic rejected by modern medicine?

In 1870, a medical journal listed garlic as "a quaint and absurd medicament, now obsolete among physicians."

Instant Cough Relief & Garlic Chips from Ted Maczka, the Fish Lake Garlic Man

When one has a cold and is coughing badly, a small piece of garlic taken in the mouth, chewed well and swallowed will give instant relief from cough. Also, one can take a clove of garlic in the mouth and take a little bite every so often and the cold will go away much faster.

To make garlic chips: peel cloves of garlic, slice them 1/8 to 3/16 thick and then dehydrate them. Store in sealed containers. When a cold is coming, chew on the garlic chips and the cold will go away much faster.

Subscription Form - The Garlic News

Connecting the Canadian garlic network

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Make cheque payable to: Paul Pospisil. Deliver or send to the address below:

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Beaver Pond Estates,
3656 Bolingbroke Road,
Maberly, Ontario K0H 2B0

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Do you have comments or questions? **Send us your garlic story and your picture and you'll be in the News!**

Spring 08 rev/5th ye

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The Farmer's Creed

I believe that a man's greatest possession is his dignity, and that no calling bestows this more abundantly than farming. I believe that hard work and honest sweat are the building blocks of character. I believe farming, despite its hardships and disappointments, is the most honest and honorable way a man can spend his days on this earth. I believe that farming nurtures the close family ties that make life rich in ways money cannot buy. I believe that farming provides education for life and that no other occupation teaches so much about birth, growth, and maturity in so many ways. I believe that many of the best things in life are indeed free; the splendor of sunrise, the rapture of wide open spaces, the exhilarating sight of your own land greening each spring. I believe that the true happiness comes from watching your crops ripen in the fields, your children grow tall in the sun, your whole family feel the pride that springs from their shared experience. I believe that by my toil I am giving more to the world than I am taking from it, an honor that does not come to all men. I believe that my life will be measured ultimately by what I have done for my fellowman, and by this standard, I fear no judgment. I believe that when a man grows old and sums up his days, he should be able to stand tall and feel pride in the life he has lived. I believe in farming, because it makes all this possible.

The Farmer' Creed was publish in Brenda Crawford's column in The North Frontenac News. *It originally appeared in a New Holland Newspaper. The author's name is unknown.*

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Figure 3. Implement used to cut garlic at the time of harvest. *Growing and Handling Garlic in California*, CA AG EXT #34, February, 1934.