

JOHN COTE



**The Master Guide To
GROWING
BIG GARLIC**



For Gardeners & Small Farms

PROVEN TECHNIQUES TO HELP GROWERS
SAVE TIME & MONEY

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Published by John Boy Farms

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Côté, Jean-Guy (John).

The Master Guide to Growing Big Garlic - Proven Techniques to Help Growers Save Time and Money

Typeset in Arial

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To my late GRANDFATHER who farmed before me, my FATHER who made me tougher and my WIFE who puts up with me.

THE MASTER GUIDE TO
GROWING BIG GARLIC
For Gardeners & Small Farms

Proven Techniques to Save Growers Time and Money

JOHN CÔTÉ

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CONTENTS

PREFACE	8
INTRODUCTION	10
1. UNDERSTANDING GARLIC	13
2. LOCATION	17
Shelter	18
Sun Exposure	20
Drainage	21
Weeds	23
Location of Trees	23
Water Sources	25
Previous Crops	26
Soil Choices	26
3. SOIL MANAGEMENT	28
Soil Types	29
Preparation & Planning	35
Tillage	37

4. FERTILITY	46
Soil Testing	47
Fertility Recommendations	48
Nutrient Deficiencies	49
Fertility Sources	51
5. GARLIC SEED	57
Bulb Adaptation & Replanting	58
Bulb & Clove Size	59
Quality	62
Quantity	65
Seed Sources	66
Bulbils	70
6. VARIETIES	72
Hardneck vs Softneck	73
Family Groups	76
7. PLANTING	96
Raised Beds	96
Fall Planting	99
Spring Planting	100
Cracking Bulbs	104
Spacing & Orientation	105
Methods & Equipment	109
Winter & Summer Mulching	115
8. GROWING	118
Weed Control	119
Watering	125
Scape Removal	127
9. HARVESTING	129
Soil Moisture	130
Timing	130
Digging	134
Field drying	135

10. POSTHARVEST	138
Washing	138
Cleaning & Trimming	140
Drying Techniques	141
Curing Process	144
Grading & Sorting	144
Storage Methods	150
Length of Storage	152
11. PESTS & DISEASES	154
Prevention	155
Pests	161
Diseases	166
Viruses	171
BIBLIOGRAPHY	173

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~ PREFACE ~

A number of years ago when I first started growing garlic as a new crop, I was eager to learn as much information as possible. I read every book I could get my hands on and talked to every garlic grower that would let me ask questions. I also searched every corner of the internet in an attempt to find any hidden treasures of knowledge that I hadn't yet found.

This quest for garlic wisdom allowed me to learn a lot of general information and helped to put me on the right track. It allowed me to start gaining experience for myself, but as time went on and I learned more things, I found myself asking more questions than I had answers for.

Often times I would read something in one book and then read the complete opposite in another. I'd go on the internet searching for clarity and would only find poor quality information or even worse, extreme contradictions. When talking with other growers, I usually found that they believed so firmly in their methods that it left them unwilling to consider alternative ideas and limited their ability to improve.

That way of thinking may work for some people, but I like to ask questions about why things are being done a certain way or if they are even

necessary at all. Generally, if I get an answer like “that’s the way it’s been done for the last 100 years” or “just because” I’m not overly satisfied.

I am not superstitious or drawn to folklore when it comes to growing crops and I’ve always tried to examine things with an open mind. I don’t claim to know everything about growing garlic and am always trying to learn more.

I’m trained as an agronomist (agricultural soil and plant sciences) and my family has been farming since the 1870s. I learned very early on that farming and science are much the same in that they are often trying to find solutions to problems. This meant that when I started farming, my scientific brain was constantly wanting more information and when I began growing garlic, it went into overdrive because I was rarely satisfied with the answers I was being given.

Over the past number of years, I have tried to take a scientific approach when looking at the garlic growing process and keep things as structured as possible. I’ve also made sure to question my own beliefs at times to ensure that I’m using best practices. My goals have actually been quite simple and primarily fallen into two categories, the first being to produce the largest garlic bulbs possible, and the second to go through the entire growing process as efficiently as possible. This seems simple, right? It has taken me longer than I expected to learn everything, but the journey has been interesting and rewarding along the way.

↪ INTRODUCTION ↩

This book is the culmination of what I have learned from others, in combination with my own experimentation. I have tried to use my academic knowledge combined with my experience in farming to come up with a very straightforward approach to growing garlic. It is not intended to contradict the methods of other successful growers or to convince people to change all the things that they are already doing. It is meant to teach both gardeners and small farmers what I have learned over the years and show them practical methods on how to grow strong, healthy garlic that produces large bulbs every year.

If you are new to growing garlic, all the information may seem overwhelming, but remember that this is intended as a starting point for you to begin your own experience. You don't need to remember everything written and you may find yourself re-reading some of the information in the future with a different understanding. If you are an experienced garlic grower, I encourage you to keep an open mind and use whatever methods you feel might benefit you. My hope is that everyone who reads this book will walk away with at least some new insights that prove valuable to them over time.

Before I get into the actual topic of growing garlic, I want to tell you a little bit about our farm and what kind of land we grow crops on. The property and operation has been the basis for much of my learning over the years and has

been my greatest source of inspiration for writing this book. I feel that it is important for you the reader to understand who we are and where this knowledge has come from.

The main John Boy Farms property is a 160-acre river lot, located in the Red River Valley of Southern Manitoba, in Western Canada. This area sits on a flat floodplain in the middle of North America, which means that it gets very hot in summer (35°C) and extremely cold in the winter (-40°C). Our weather fluctuates widely from wet years to dry years, meaning we have to be prepared for both.

The black soils that are found here were formed as lake sediments and developed over time under tallgrass prairie. This means that they are highly fertile, but are heavy and mostly clay texture. We also farm some undulating land about 100 kms (60 miles) from our main site that is mostly sand and has lower fertility. Over time, we have had to learn how to make both of these locations work for our operation and to grow garlic on the two most extreme soil types, in one of the most extreme climates in the world.

My family has been farming the same land for over 140 years and I'm the fifth generation to proudly take ownership. This has been a huge benefit to us because we understand the soils, the climate and the history of certain fields (e.g., wet spots, weed problems and where the old manure piles are located). This background knowledge has been wonderful, however, it has not insulated us from the challenges of farming and there have been many pitfalls along the way.

When we first started growing garlic as a new crop, there was a steep learning curve for us and it took some time to get things working as efficiently as we wanted. After a few years, we were able to get our production to run fairly smoothly and over time we found garlic to be one of the easiest crops for us to grow. It was also one of the most profitable crops and we seemed to be able to sell as much as we could produce. Every year we would grow a little more and every year we would sell out of garlic early. After a few seasons, we

stopped growing most of our other crops and decided to focus entirely on garlic, with an emphasis on producing very large, high-quality bulbs.

Initially, we planted, weeded and harvested everything by hand, however, as we have grown in size we have added more tools and equipment to help with these tasks. The farm work is still very labour intensive, but having some equipment to help with the production has allowed us to continue growing more each year without harming the quality of our garlic.



The original farmhouse built in 1879 standing in front of our modern farm shed.

~ Chapter 1 ~

UNDERSTANDING GARLIC

If you want to have success growing any plant food, you need to really understand where it comes from and what its needs are. In the case of garlic, we know that it has been grown by humans for thousands of years and is one of the most popular vegetable crops on earth. It has been found with artifacts in Egyptian tombs, most notably King Tutankhamen, and is mentioned in both the Bible and Koran as an important food staple. The ancient Greeks and Romans both wrote about it and we know that it was being used in traditional eastern medicine starting at least two thousand years ago.

Garlic is believed to have originated in central Asia and gradually spread to almost every corner of the world. This includes some of the coldest, hottest, driest and wettest places on every continent except Antarctica. As long as there is somewhat of a growing season, a bit of soil and enough water available, garlic can usually be grown.

Although garlic is a tough and hardy plant, growers have learned over time that a little bit of care can go a very long way in helping improve its success. In its natural state, garlic grows in small clumps with stunted tops that resemble grass or chives. These clumps have very small cloves that are

buried extremely deep in the soil (or often gravel). It's only when humans started to remove these small cloves and replanting them individually that garlic began to increase in size and resemble the modern bulbs we have today.

Keeping this fact in mind is important because we must realize that from the very beginning of the cultivation of garlic, humans have been creating an artificial situation. The act of digging the garlic out of the ground, breaking the cloves up and replanting them is a completely unnatural process. In fact, it is so unnatural that almost all modern garlic has completely lost its ability to sexually reproduce on its own and now requires humans for propagation.

This means that in some strange way, when cultivating garlic, we are moving far away from its natural environment of a harsh windswept landscape with extreme temperature swings and dry, rocky, nutrient-deficient soils to a growing environment that is milder, more sheltered, has loose rich soils, high fertility, adequate moisture and more growing space for each individual clove.

Another way to put this in perspective is to consider garlic as a human, where if a person were to grow up with very little food, water and shelter, they would end up being extremely tough and resilient. However, they would also likely be shorter and thinner than they otherwise would have been under ideal conditions.. At the other extreme, if that same person grows up with the right amount of food, vitamins, water and shelter they will likely be taller and stronger. Now, if this person is an Olympic athlete that weight lifts and has a perfectly tailored diet, they will be even more impressive, large and muscular.

Growing garlic is much the same and has similar results depending on the growing conditions. If neglected, garlic becomes hardy, small and stunted. If treated like an Olympic athlete, amazing things can happen and the plants can perform on a world-class level. Understanding this is the key to consistently growing the largest and healthiest bulbs.



Big healthy garlic bulbs grown under optimal growing conditions.

Learning what garlic requires and actually translating it into real-life applications is not always simple, especially if you don't know where to start. I often tell new garlic growers that garlic is both the hardest and easiest crop to grow! What I mean by this is that garlic should be an easy crop to grow in theory, but doesn't always end up that way.

You throw some cloves in the ground in the fall, wait until spring and then voila they pop up and start growing. You wait a few more months and wow, you're digging big beautiful garlic bulbs out of the soil. This happens for some people, but many growers and gardeners are extremely disappointed at the

size of their bulbs after their first harvest. Some even have complete failures and then either repeat the same mistakes again or quit altogether before they've really begun. This is why it is important to truly understand what is required to grow large, healthy garlic bulbs and come up with a plan before the season starts.

◀ Chapter 2 ▶

LOCATION

We have all heard people say “location is everything”, but the problem is that most homeowners, gardeners and farmers do not choose their property based on how well their garlic plants will grow. Even our farm is located in a “less than ideal” location that has its limitations. This means that the majority of us just have to work with what we have and try to make the most of the overall location we start with. This is not a problem as garlic is amazingly adaptable and can be grown almost anywhere with great success.

Garlic appreciates cold winters, however, it can still be grown in warm climates especially with certain family groups and can be grown equally well on sandy and clay soils. This means that you shouldn't get too worried or feel discouraged by your location and remember that no matter where you have room to plant your garlic, there are always ways to make it successful.

That being said, oftentimes picking the right spot within a location can make a huge difference in how well your garlic will perform. In fact, I would say that the region you grow garlic in, is less important than the choice of location

within your property. Obviously, every site is unique and there are usually special considerations that need ironing out in the beginning, but if you understand the basic requirements and best growing practices for garlic, you'll greatly improve the odds of success in your favour.

Shelter

An ideal location for growing garlic is in a sheltered spot with protection provided by forest, hills, buildings or other structures like a fence on the sides that receive prevailing winds during the growing season (for the majority of North America, that's the north and west sides). Most home gardens within towns or cities are already fairly sheltered, but more open locations are often quite exposed.

Planting garlic in a sheltered area or providing protection through temporary means has a number of benefits. Most notably, the soil and air will be warmer in early spring and your garlic will be spared from most wind gusts during storms and protective covers like snow and mulches won't be blown away.

Our farm is located on flat, wide open prairie land, where high winds are a regular occurrence and there is not a lot of natural shelter. This can cause problems year-round for us. In the fall, it can make covering the garlic with straw more difficult, and during the winter, the snow-cover protecting the garlic beds can be blown away. During the spring and summer months when the plants are growing, the leaves can break (usually halfway) causing them to dry out.



Leaf damage caused by strong winds in an open and exposed growing area.

We plant a large amount of our main garlic crop in wide open fields that generally receive a large amount of wind. It still grows very well, but we do end up with some of the leaves breaking and this obviously affects the end size of the bulbs. This can be difficult to completely eliminate when growing on a larger scale, but we have used a number of strategies over the years that work well on smaller farms and gardens.

This includes putting up wind barrier fencing (made out of netting) or planting a few rows of corn around the planting area in spring so that it's full-grown before fall planting. In some of our fields, we've also planted some fast-growing trees like poplar and willow for a more permanent shelter belt, which started to make a big difference after only a few years.

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Drainage

Good drainage is one of the most common things overlooked by new growers and I cannot emphasize enough how important it is. Garlic requires good soil moisture for most of the growing season, however, it does not like to be overly saturated with water for any appreciable amount of time. This means that it will do best on good draining land that doesn't have standing water during wet periods. In general, a slight gradual slope to help move water in spring or during heavy rains will ensure excess water drains off but allows enough time for the ground to absorb some moisture.



A field draining after a severe storm that had 5 inches of rain. The gentle slope of the land prevented the garlic from being exposed to standing water and ultimately drowning the plants.

The amount of drainage required will greatly depend on the type of soil you have. On most sandy soils, no artificial drainage is required as excess water will move down through the soil fairly quickly with gravity. On heavier clay soils, where water can sit for long periods of time, surface drainage is very important to allow for the quick removal of water. Slopes and ditches are the most effective and cheapest way of accomplishing this.

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Chapter 5

GARLIC SEED

The term "garlic seed" is usually used to describe garlic cloves or bulbils harvested from the previous growing season to plant next year's crop. This means that garlic seed is actually the vegetative propagation (or clone) of a sister plant and not true seed in the scientific sense. In some rare cases (usually at universities or commercial research labs) true garlic seed can be produced, however, precise steps are taken to create the specialized conditions required for this to happen. This means that garlic varieties almost never change genetically from year to year and stay "true" to their varietal group.

Any changes that do occur, happen over hundreds or even thousands of years from rare genetic mutations likely one bulb at a time. If a bulb that has a new mutation survives and is replanted for multiple generations, then a new variety is born. Over thousands of years, this is what developed the many varieties that exist today. Although possible, this process is so rare that it is extremely unlikely that a grower would ever discover a new mutation worth propagating.

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Bulb & Clove Size

Whether you are planting your own garlic seed or choosing an outside source, you'll have to decide what size of bulbs and cloves you want to use. A very common question that I get asked by new growers is what size bulbs they should plant and does it make any difference.

This is not a simple question and depends on a few factors. Both bulbs and cloves come in a wide range of sizes depending on the variety and the growing year. Some varieties like those in the Porcelain family have very big cloves no matter the size of the bulb. Other varieties like Silverskin have bulbs with a large number of small cloves.



Clove from a large porcelain bulb on the left and small purple stripe bulb on the right.

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Hardneck vs Softneck

There are hundreds of different varieties of garlic grown in the world, all with unique characteristics. As most garlic growers know, they can be broken down into two main groups called hardneck and softneck.

Scape Development

Hardneck garlic lends its name to the flowering stock it shoots up (or bolts) during the growing season and subsequently becomes hard. This hard stock starts at the base of the bulb and goes up through the neck, causing it to be a "hardneck".

Softneck garlic, on the other hand, does not generally send up a flower stock, unless grown in very cold climates or under stressful conditions where they sometimes do sporadically. If they do bolt, the bulbils usually form in the base of stock, just above the soil line. On our farm, about 10% to 20% of our softneck garlic bolts every year because of the very cold winters.

Braiding & Bunching

Since softneck garlic lacks a hard stock, it can easily be braided after harvest. Braiding should be completed once the garlic tops have begun to dry, but before the leaves have become brittle. A balance between braiding too early where moulds can develop and braiding too late where the tops can become too fragile to weave anymore must be found.



Braided softneck garlic ready for the Farmers' Market



Four large hardneck bulbs bundled for the Farmers' Market.

Although Hardnecks can also be braided, it is much more difficult and not often done. The neck must be crushed in order to make them pliable enough to weave into braids. This can be done by running a rolling pin up and down the stock. To save work, many growers make nice looking bunches to sell (or for storage) as an alternative to braids.

Storage

Softneck garlic tends to store much longer than hardneck garlic. This is because bulbs skins on softnecks are much tighter around the neck which prevents moisture on the inside of the bulbs from leaving and prevents diseases on the outside from getting in.

Softnecks will generally store for up to a year while hardneck storage ability generally ranges from 4 to 8 months.

Climates

In general, hardneck varieties tend to be more suited to cold climates, whereas softnecks tend to thrive in warmer environments (although with a bit of care, both can be grown successfully in most places).

Within the softneck and hardneck groupings, there are specific garlic families. These families all have different characteristics, however, all share the same habit of either forming a scape structure or not. To complicate things a little bit, some families within the two garlic groupings will only form a scape in certain climates, such as those with cold winters. Most garlic growers call these weakly bolting, although they are technically considered to be hardnecks.

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Spring Planting

In warm regions like California or the Southern United States, garlic can be planted in late winter or early spring fairly easily, however, this is only possible because of their mild temperatures and longer growing season. In northern climates, spring-planted cloves often do not form bulbs at all (rounds) and if they do, they are almost always substantially smaller than fall-planted cloves.

Although planting in the spring is not considered ideal, there are sometimes circumstances that leave a grower needing to do so anyway. It is still possible to grow and harvest good quality garlic as long as a few strategies are followed.

Finding Spring Garlic Seed

One of the biggest challenges for many growers is finding spring garlic bulbs to plant in the first place. Most garlic varieties offered by seed companies are only available in late summer or fall. If you managed to store garlic over the winter or are able to find another grower with some good quality bulbs, then you are in luck! For anyone who doesn't have a source, you can usually find some "spring garlic seed" at garden centers, greenhouses or seed companies.

"Spring garlic seed" is almost always a softneck variety that comes from a region like California. These warm-season garlic varieties do not need very much cold exposure, meaning that the bulbs can usually be planted right after they've been purchased. They don't need to be chilled before planting and will likely start growing very quickly once placed in the ground. Although this type of garlic is not ideal for more northern locations, it can still produce smaller bulbs and give you something to harvest.

Cold Exposure

If you are planting a hardneck garlic variety in spring, the bulbs will need some cold exposure for proper growth (although, softneck garlic can also benefit

from some cold exposure). The ideal temperature is 0 °C (32 °F) to -3 °C (26 °F) when trying to vernalize or "trick" the garlic cloves into thinking they went through winter. This process can be challenging without the help of mother nature, although refrigerator temperatures (usually 1 to 3 °C) can also work.

Vernalization can be accomplished by placing the garlic in a refrigerator, as cold as possible, for at least 2 to 3 weeks. The longer the period of cold exposure is, the stronger the effect. That means that when time allows, a more extended period of up to 2 months in cold storage can be beneficial.

Without vernalization, the garlic plants will not form bulbs properly, producing single clove bulbs called rounds. These rounds are perfectly good to eat and can be replanted in fall with success. They should develop good-sized bulbs with multiple cloves the following summer.



A row of single-cloved bulbs called rounds (top) compared to a row of individual cloves taken from a regular multi-cloved bulb (bottom)

If using refrigeration for vernalization, it is important to remember that it can dehydrate the garlic over a longer period. Some growers place the garlic in a plastic bag (sometimes with holes for ventilation) to prevent excess drying. This often works well, however, you must keep an eye on the garlic to make sure it does not develop mould, rot or start sending out roots. If the roots start growing, it's best to plant the bulbs soon after.

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Digging

The method you use to harvest your garlic will likely depend on the size of the growing area you have. In gardens and small fields, a pitchfork or broadfork can be used to loosen the soil before pulling. In market gardens or commercial fields, an undercutter bar is usually pulled behind a tractor and run under the garlic bulbs to loosen the roots and make harvesting easy. I've also seen potato harvesters used, however, it is very important to be careful not to damage the bulbs during the digging process. Most root crop diggers that use conveyor chains or shaking baskets are too aggressive and often cause bulb damage during harvest.



A small undercutter pulled by a 25 horsepower tractor (left) and a large undercutter pulled by a 55 hp tractor (right).

Once the garlic has been loosened from the soil, the plants can be pulled out of the ground and given an initial cleaning (i.e. brushing off excess soil) either in the field or in another area such as a shed. It is preferable to keep the bulbs out of direct sunlight when extremely high temperatures are expected as it can sometimes damage them or cause small green blotches.

No matter what method of harvesting you use, it is important to work with some caution because any nicks or bruises will cause issues afterward. Often

damage is not noticed during the digging process but shows up later during curing or storage. Damage allows disease pathogens to enter the bulbs causing decay and often leaves the garlic unmarketable for growers who sell their bulbs.

Field drying

Once the garlic has been harvested, it can either be brought inside or left outside on the ground for several days. This is a topic where there is some debate among growers as to what the best method is.

Some growers believe that you should always bring garlic into a sheltered area immediately after harvest. The thinking is that the bulbs need to be protected from sun scalding and possible rain. On the other hand, there are others who say that you should always leave harvested garlic outside in the sun first to help dry down the tops before bringing them inside. The argument being that sun drying helps prevent disease issues and speeds up the curing process.

What I've discovered personally over the years, is that field drying is by far the best way to jump-start the drying process. It reduces total drying time and lowers the level of storage diseases significantly. When we started to use this method, one of the first things I noticed was that moulds and decay were almost completely eliminated from the curing process. Before this, one of the main issues we would have, was rot developing in the necks while the garlic was hanging inside our shed. This was especially bad in years where we had received a lot of rain and the garlic came out of the ground holding a lot of moisture. By leaving them in the sun first, a large portion of the moisture was removed from the entire plant before continuing the drying process inside. This lowering of water content significantly reduced the ability of many diseases to cause problems.



A single-layered row of harvested garlic drying in the field for several days. Bulbs have been left in the sun without being covered because of cooler temperatures.

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