



Plasticulture



Farming for Everybody

*The Small Farmer's Guide to Producing
High Yields With Modest Resources*



Otis Lester Bray

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Preface

Our Creator provided a plan for feeding all living creatures. He also gave us the ability to adapt and create new methods of producing food as we experience changes in our world.

Across our nation, growers of food crops are faced with the prospect of providing more food with dwindling resources – primarily water and good, fertile land. We are being told that the world’s food needs will double by the year 2050. Unfortunately, our current system of growing crops on large farms in centralized areas of the nation and transporting those crops thousands of miles to reach buyers is both inefficient and wasteful. It also requires enormous amounts of fuel and adds to the carbon footprint.

Plasticulture farming, however, offers an opportunity to transcend these problems. Though the specific opportunities offered in this plasticulture farming plan are limited in scope and apply primarily to my local area, the Piedmont region of Georgia, they are still extremely valuable. At the very least, they will afford improvements in our diet and provide income for many of our citizens, if properly implemented.

First, I must draw your attention to a group of dedicated, hard-working folks who have modeled a successful food growing plan for local food banks, children’s homes, and women and children shelters. They have also provided countless meals for the homeless, all using the plasticulture methods described in this book.

I'm talking about the Fayette County, Georgia chapter of Plant-A-Row for the Hungry (PAR), which is embedded within the Fayette County Master Gardeners group. Nine years ago, I was invited to join this group to teach plasticulture growing methods. Concurrently with my invitation, the New Hope Baptist Church in North Fayette County offered the use of a planting site that had been grassland for twenty-five years and offered access to a 45 gallon-per-minute (GPM) well.

On this one-acre site, the PAR group has managed to produce 20,000+ pounds of typical seasonal produce each year. The “secret” to these incredible yields is plasticulture farming. We have proven many times that our plasticulture system works, even with a limited water supply. Thanks to the PAR's good work, they have been widely recognized and, as a result, a number of “satellite” PAR gardens have appeared locally and in adjoining counties. This, of course, is a wonderful thing!

Another dimension of this story began when the Pearson Farm in Fort Valley, Georgia volunteered to join the effort. Pearson Farm has donated 35,000 pounds of peaches to the PAR's distribution each year since 2010, proving once again that when God opens one door through which we can serve, if we step through, He will open another!





I have been blessed to be able to share this information with a number of individuals and growers over the years. In the process, I have made a large number of wonderful friends. As I approach my 88th birthday, the time has come to write it all down. This book should be seen as an attempt to provide a clear picture of the plasticulture process – how it works, why it works, and how you can use it to start an income-producing produce farm.

I also offer as much information as possible to support plasticulture's implementation in an environment of modest land availability and water resources. The plan is simple in design, easy to execute, and can be used in many different settings to improve yield and growth.

Recognizing the Opportunity

After fifty years of working with plasticulture methods, I am convinced that we have an opportunity in the Georgia Piedmont to combine two largely unrecognized assets to produce a significant amount of fresh, wholesome food for our communities.

1. Thousands of acres of fallow, sterile grassland
2. The limited, but dependable, water contained within the subterranean granite layer that runs throughout this region

For these fifty years, I have focused on adapting a workable plasticulture farming plan for all of the most common vegetable crops planted in the Georgia Piedmont. The process can be used extensively to grow tomatoes, melons, peppers, and many other foods loved throughout the United States.

After helping dozens of growers and backyard gardeners adapt plasticulture methods in all kinds of settings, I've come to understand the value of sterile, fallow land. After returning to land that I farmed twenty-five years ago, planting crops, and witnessing the eye-opening improvements in health and yield for every single plot, I became convinced that an opportunity exists.

I first became interested in plasticulture farming in the mid-1960s when the materials first became available. Although my chosen profession was the aircraft engine business (50 years), I have always had a high level of interest in farming and have farmed on a part-time basis all of my adult life. I have

worked to develop methods that allow growers to produce most of our local food crops using plasticulture. Among other benefits, the methods allow us to properly manage a limited water supply for maximum yield.

By focusing on our dependable underground water sources and our large, vacant tracts of underused grasslands (pastures, mainly) that are free of soil diseases, I developed the plan that follows in this book.



The Land

When we discontinued the production of cotton after World War II, much of our open land was converted to pasture and continues to be used that way today. After 150 years of growing cotton, the land was contaminated with wilt, blight, and other soil diseases. Planting small grains and grass was – and continues to be – the best and easiest way to cleanse the diseased land. After decades of being dedicated to grass, this land is as sterile as it was when the first settlers arrived.

I am convinced that finding sterile land is, on the whole, more valuable than finding fertile land. We can add fertility, but only nature can restore sterility. Nowadays, we have thousands of acres of underused, sterile pastureland.

In this area, we also stand every day on top of a very large reservoir of fresh, pure water that is trapped in cracks and fissures in a subterranean layer of granite. This water-containing rock layer spans territory from the fall line in Middle/South Georgia to the Appalachian mountain chain.

In a patch of land, we find several inches of topsoil and some 50 feet of hard red clay. Between the clay and the granite is usually an area of wet sand and gravel where the water is collecting on top of the granite before it works its way into the cracks in the layer beneath. These cracks are inter-connected and filled with water.

The existence of these thousands of acres of fallow, sterile, unused pasture and other grasslands, plus the limited but dependable water supply trapped

in the cracks of the underground granite, offers many opportunities to begin a productive and risk-free growing operation in the Georgia Piedmont area. As a result, we can more effectively supply the food we will need in the years to come.



The Five-Acre Growing Site

Before getting into the “how” and “why” of plasticulture, let’s take a moment to discuss the framework I use throughout this text – a framework defined by a hypothetical five-acre produce-growing site with a 15 GPM (or more) water source.

Using this five-acre framework, we’ll consider a long-season plan to support a market, farm-to-table operation, CSA boxes, non-profit community gardens, and backyard growers – all through plasticulture farming, of course. The five-acre growing site should provide significant seasonal produce from mid-May to the first freeze. And yes, it’s a large enough growing site to support a sustainable, profit-generating family farm!

The cultural information discussed for the five-acre plan is universal regardless of whether one adopts the plan in full or just in part. The plan is labor intensive, and the implementation of the full five acres would require 2-3 people for the fieldwork during peak growing times. My best guess is that 2000 man-hours of fieldwork would be needed during the season.

The scope of each planting will largely be controlled by the availability of the needed labor. Some facts that need to be considered in the decision to follow this plan are:

- If you match the yields of the PAR garden, the retail value of that yield will equal 150% of the gross income derived from 100 acres of soybeans, 100 acres of cotton, or 100 acres of corn as calculated from current commodity prices multiplied by average state yields.

- The required equipment costs are much lower and the risk of crop failure is extremely low if the cultural practices are properly executed.
- Offering quality produce for sale is a recession-proof business and is not exposed to the fluctuations of commodity prices.
- The opportunity to convert small tracts of unused, sterile pastureland to the growing of produce can improve the diet and financial status of many of our citizens.
- This plan is tailored to the Georgia Piedmont because it is the area with which I am most familiar. It is also based on conventional farming practices because those are the only methods I know; however, I would expect that an experienced organic grower could perform the necessary conversions and substitutions using the data provided.
- The divisions of planting space and times are based on proven production capabilities and harvest windows.
- Several of these crops have relatively low profit margins due to labor costs. However, it's important to note that having certain produce in your mix (corn, okra, beans) will bring customers into your market to buy your tomatoes, which is your best chance to be really profitable. In other words, okra might be more profitable than it looks!



What is Plasticulture? Why Does it Work?

Plasticulture farming is practiced extensively in all regions of the United States. Tomatoes, peppers, melons, strawberries, and other vine crops are grown on plastic mulch.

The process consists of laying a 1 millimeter-thick plastic sheet (usually 4' wide) over a prepared, fertilized planting bed with an 8 millimeter, 5/8" fabricated drip tube underneath to provide moisture. Transplants and/or seeds are planted through holes punched or cut in the plastic and allowed to grow for the entire season.

It is my observation that most crops subject to plasticulture methods will experience a two to three-fold yield increase over those planted using conventional methods.

Before going any further, we must first establish an understanding of why plasticulture farming works and the several advantages of using it in conjunction with drip irrigation:

- **Earlier crops:** A significant benefit of plasticulture is increased soil temperature in the planting bed, which promotes faster crop development and earlier yields. Black plastic mulch can move the harvest time up by 7 to 14 days.
- **Reduced evaporation:** Plastic reduces soil water loss. As a result, more uniform soil moisture is maintained. Plant growth on mulch can be twice that of unmulched soil.

- **Fewer weeds:** Black-on-black and white-on-black mulches reduce light penetration to the soil, so weeds cannot generally survive under the mulch.
- **Reduced soil compaction:** The soil under the plastic mulch remains loose, friable, and well aerated. Roots have access to adequate oxygen and microbial activity is enhanced.
- **Root pruning is eliminated:** Cultivation is eliminated, except for the area between the mulched strips. Weed growth in these areas can be controlled by cultivation or use of an herbicide.
- **Cleaner products:** The edible product from a mulched bed is cleaner and less likely to rot because no soil is splashed onto the plant or fruit.
- **Increased carbon dioxide levels:** Research has shown that high levels of carbon dioxide, which is necessary for photosynthesis, may build up under the plastic. Because the film does not allow the gas to escape easily, it has to sneak out through the holes punched for the plants. A “chimney effect” is achieved, resulting in abundant carbon dioxide for the actively growing leaves.
- **Prevents fertilizer leaching:** On unprotected soil, heavy rain can cause fertilizer to migrate below the root zone. Plastic mulch protects the loose, friable soil and keeps the fertilizer in place.

Now that we understand the “why” and “how” of plasticulture, it’s time to discuss the cultural practices, equipment, and components needed to allow the plasticulture process to work. We must also consider the planting dates, allocation of planting space, and detailed information on the management of specific crops. In so doing, we can facilitate a planting process that provides a continuous supply of produce for a market.

Marketing

I have no specific training in marketing; however, I have witnessed a number of successful small farm operations and can share my observations.

For starters, you must be located where you will have a sufficient number of potential customers. A busy highway or a residential area is best. From there, you can establish your off-site market, farm-to-table operation, and/or provide CSA boxes.

Keep in mind that you need to sell your produce at near-retail prices. The high level of interest we are currently experiencing in locally grown produce should provide you with an opportunity to charge 85-95% of grocery store prices.

To attract customers and keep them coming back, sell only top-grade produce and stick with an established price throughout the season. If you have edible lower-grade produce, donate it to your local food bank or shelters. Even if it won't sell, it can still provide someone with a meal.

Try to always have the most popular items in stock at all times. If you have to, purchase “fill-in” items from the local wholesale farmers' market or from other growers to keep popular items on the shelves. It will pay off. Popular items in this region include tomatoes, corn, melons, summer squash, okra, cucumbers, peppers, eggplant, and any other items that happen to be popular where you live.

Finding Your Water Source

Hydrologists tell us it takes 300 to 600 years for rainwater falling on top of the ground to work its way into what will ultimately become our preferred water source for crops. The total water content in the subterranean granite layer is so enormous that it is hard to comprehend.

We have no aboveground method of determining the location of the cracks from which we can extract this water. To find the water, we use a trial-and-error method of drilling a six-inch hole into the granite with the goal of hitting a crack that is wide enough to provide what we need. When we drill for water in Fayette County, Georgia, where I live, we think we have a 75-90% chance of finding a crack that provides 15-20 gallons of water per minute within a 500-foot depth. 15+ GPM will provide sufficient water for the hypothetical five-acre plasticulture farming plan presented here. Once established, these wells are very dependable and seldom fail. Droughts have no impact on this water supply.

Be sure to add a cycle stop to your well pump. This device is modestly priced and its addition will save on power bills as it provides constant PSI (50-60) and allows the pump to run continuously, eliminating water hammer from pump cycling and extending the life of the impeller.

If you already have a stable pond, you can use it as a water source, too. Be sure to route the water through a sand-filtering system to prevent algae buildup within the drip emitters.

Designing the Irrigation System

Designing an irrigation system can be relatively difficult for a beginner. If your system involves multiple feeder lines and manifolds, you should allow the supplier to provide help.

Berry Hill Irrigation (3744 US-58, Buffalo Junction, VA 24529)¹, which focuses on small growers and backyard gardeners, offers ready-to-assemble irrigation kits in several sizes. They also provide design help with any of their systems. The standard drip tape used by most growers is 8 MIL tape with 12” dripper spacing. At 10 PSI, this configuration will apply .45 gallons of water per minute per 100 linear feet.

Water management is key to your success. The initial wetting of the plastic-covered planting bed should soak the entire bed thoroughly. This ensures that the fertilizer is disseminated and converted to usable form.

The type of soil beneath the plastic determines the time required to accomplish initial hydration. With the system operating at 8-10 PSI, you will usually need 18-24 hours of continuous operation.

After hydration, the daily operating time must be customized according to several variables:

- Type of soil
- Current outside temperatures

¹ Other than having familiarity with their products, I have no relationship with Berry Hill Irrigation or any other equipment manufacturer mentioned in this text.

- Size of plant
- Stage of growth

The bed needs to be damp at the time of seeding and kept in that condition going forward. The initial daily watering time usually requires 1.5 or 2 hours as the season progresses and temperatures rise. Increase that to 2-2.5 hours per day as the plant size increases.

These systems can operate at 5 to 15 PSI, which means a great variation in the amount of water applied in a given time. That being the case, you need to check the planting beds frequently by punching a small hole for access. The beds should be damp from shoulder to shoulder. Adjust the times as needed to accomplish this. Plants respond better to consistent watering and the risk of leaving the water uncontrolled for a long period is unacceptable.

A timer is necessary in every system. Timers are available in many sizes, including small, battery-powered units that fit onto 3/4" garden hoses and large, multi-zone configurations.

If a system is allowed to run for more than a few hours, fertilizer will leach out of the root zone and go to waste. The only way to reapply fertilizer is through the drip system and the amount needed will become hard to calculate.



Choosing Your Plastic Mulch

The standard plastic choice for most applications is 1 MIL black-on-black or white-on-black (4 ft. width), which is usually sold in 4,000 ft. rolls. Choose black-on-black for early planting to gain the benefit of warm soil and earlier maturity.

Choose white-on-black for crops planted after mid-May to achieve a 15-degree lower surface temperature in mid-season and avoid injuring the tender plants. One of the major advantages of plasticulture is the ability to lay it in advance of planting time and stay on schedule with successive planting schemes, regardless of weather conditions. We always lay the plastic for our February-March onions and potatoes in the late fall before the winter rains start. Some tomato growers lay the plastic for early tomato crops in the fall. It will retain usable status until planting time.

I will not make an attempt to provide laying information. There are videos online that depict the process far better than any written instruction – search for them! Since you use a layer only a few times per year, go online and look for a co-owner. This implement, like all tillage equipment, will hold its value for many years.

Choosing Your Fertilizer

Perform a soil test to determine fertilizer and lime needs. If lime is required, apply 125% of the recommended amount. Our experience has shown that if we only apply the recommended amount of lime, the result will be a PH of 6.2-6.3. Vegetable crops, tomatoes in particular, prefer a slightly higher PH than this.

The soil test will show the amount of balanced fertilizer needed for a 100 ft. row, but we must temper that with the fact that many of our crops are planted in double rows on each bed. Since we plant many different crops in the same plot, we try to match a universal application plan acceptable to all crops. Many of our growers use this distribution plan and it seems to work: Apply 12 to 15 lbs. of fertilizer per 100 linear feet. Use Super Rainbow 10-10-10 or an equivalent product.

We use a balanced 10-10-10 mineralized fertilizer because it contains the minor elements needed for vegetable crops. Using this complete product is important to achieve the best results! Don't buy the less expensive "box" store products.

The fertilizer is applied in 24" to 30" bands to provide fertility as the plant root system grows. This application is usually sufficient for the entire growing season with the exception of tomatoes, but we'll address that exception in the cultural practices section.

The mulch layer will mix the fertilizer with soil and create a crowned, raised bed. In our PAR garden, we use a 30” drop fertilizer spreader, which we pull with a golf cart or ATV. Some of our growers use a slinger-type spreader with a skirt added to control the width of application.



Choosing Your Seed

The subject of seed is broad and could take days to cover. The development of disease-resistant seed varieties provides giant advancements in our ability to produce higher yields of better quality produce with less effort than ever before.

I have spent 50 years in search of the most desirable varieties for our area. No single answer exists for any particular crop, and personal preference certainly plays a role.

I have many years of experience teaching gardening classes and one of the questions most often asked is: “What varieties should I plant and where do I procure them?” Thankfully, there are several right answers. We are blessed with multiple seed providers² who focus on varieties that are compatible with our area. While I like to support local businesses, we live in a limited farming area and the garden centers and local seed and feed stores offer very limited choices. There simply aren’t enough sales to warrant the inventory investment, so I have had to look for seed outside my immediate area.

The following list comprises the total seed purchased in 2016 for our PAR garden and my own backyard planting:

Willhite Seed Inc., Poolville, TX 76487, 800-828-1840, willhiteseed.com

- Clemson Spineless 80 Okra

² Other than direct experience using their seeds, I have no connection or relationship with any of the named vendors or supplies

- Silver Queen Corn
- Super 45 Cantaloupes
- Midas II Yellow Summer Squash
- Senator Zucchini Squash
- Cut Master Seedless Watermelon

Willhite Seed Company is a long-established, family-owned seed company that has been a leader in the development of melon varieties for many years. The Super 45 cantaloupe and Cut Master seedless watermelon are among our favorites. All the varieties in Willhite's catalog would do well in the Georgia Piedmont.

Twilley Seed Company, Hodges, SC, 800-622-7333, twilleyseed.com

- Watermelon Shiny Boy
- Southern Green Turnip
- Royal Crown Turnip
- Savanna Mustard
- Lacinato Kale
- Cinderella Carriage Pumpkin
- Mustang Pumpkin

Twilley focuses on small growers and has a long history of offering all the latest hybrid varieties. They offer a complete line of the Cole crop varieties we speak to in the early and late planting proposals, plus most of the other suggested varieties.

Clifton Seed Company, Moultrie, GA, 229-891-2221, cliftonseed.com

- Green Beans – Greencrop
- Corn – Silver King
- Southern Peas – Pinkeye Purple Hull

Clifton Seed Company has a large inventory of most of the seeds we plant

locally and is a good source for growers who require larger amounts of seed.

Seeds 'n Such, Graniteville, SC , 803-663-501, seedsnsuch.com

- Tomato – Original Goliath (Po1)
- Tomato – Celebrity
- Eureka – Cucumber
- Early Sunsation – Bell Pepper
- King Arthur – Bell Pepper

Seeds 'n Such is a small specialty seed company featuring hundreds of tomato and pepper varieties and some other vegetables.

Johnny's Selected Seeds, Winslow, ME, 877-564-6697, johnnyseeds.com

- Hakurei Turnip
- Siberian Kale
- Batavia Lettuce

Johnny's is an excellent provider with a large inventory of seeds. They provide some specialty items not found elsewhere; however, because of their northerly location, their focus is short season, cooler climate varieties that might not work in our area. The Hakurei “salad” turnip is a must as is the Batavia lettuce that grows well in hot weather.

Our first objective is to choose seed that yields a food with excellent taste and appearance. Our second objective is to find seed that provides an acceptable yield. Thirdly, we're looking for seed with the maximum level of disease resistance.

Some of the varieties we choose are hybrids; some are open pollinated. The hybrid seeds are obviously much more expensive, but one of the great features of plasticulture is a high germination rate that limits the amount of seeds needed. Do not allow the price of seed to determine your choices! The additional yield from the more advanced varieties will more than compensate for the increased cost.

Call these providers to order a paper catalog, or explore their offerings online. The catalog will typically be the only source for information on disease resistance, plant size, yields potential, and seed count. Use the catalog depth-planting chart for each individual crop. This resource provides the essential information needed to plant your garden.

Every good garden begins with good planning. Space allocation, planting distance, and seed-per-hill are essential factors. We will soon explore these factors so that you can evaluate how much seed you need. Leftover seed is viable for at least two years and should be stored in a sealed container.

Completing a site plan and ordering seed early is very important (before March 1st)! Some of the most popular varieties sell out quickly and shipping dates can be problematic in the busy season.



Required Tools and Equipment

Most of the tools and equipment you need are standard farm implements. Here is a list of what we use in our PAR garden:

- Pull-type drop fertilizer spreader, 30”
- 1968 Model Ford 3000 tractor, 40 HP
- 5-shank all-purpose plow
- 5-foot 16-disc smoothing harrow
- 5-foot 3-point hitch rototiller
- 4-gallon battery-powered Hudson NeverPump sprayer; this sprayer maintains a steady 60 PSI
- Push-type Earthway seeder

The rototiller is optional if you have sandy loam soil that can be worked into a smooth surface to accommodate the mulch layer. A fan-type tractor-mounted sprayer will be needed for larger plantings. For large plantings, also consider a tractor-mounted hole punch. HPI from Berry Hill and the Berry Hill Planter #P1 deserve consideration.

The Earthway seeder has been a standard for backyard gardeners for many years; however, large plantings of Cole crops are better served with one of the more advanced push-type seeders. Look online and check out the available inventory. Also consider the small seed planters that can be mounted on a tool bar or cultivator frame.

Though I have not tested it, Berry Hill introduced a new push-type seeder in 2017 that will plant multiple crops through the plastic! Demonstration videos on YouTube also show the Ferris Farm PolyPlanter Jr. seeder, which could be a great labor saver. I suggest giving these products some attention.

If you must purchase a mulch layer, a recent introduction of a 3'-4' compact layer, the Berry Hill RB448, which makes a crowned 4" height bed is now available. This layer is well constructed and only requires a 30-HP tractor. The price is approximately \$2,000.00, plus shipping.



Controlling Nuisance Animals

Deer control is absolutely critical. The two major methods of controlling deer are:

- **Electric fence:** This is the first choice of most growers. Standard construction consists of 6' t-post or equivalent on 20' centers with 14-gauge wire spaced from the ground at intervals of 6"-24"-42"-60". A 120-volt electrical system, solar power, or batteries can power the fence chargers.
- **Deer netting:** This is a woven material, usually with a 1" pattern. It is available in 5', 6', or 7' heights. Deer netting looks fragile, but it works well. Deer do not usually make an effort to breach any type of barrier.

Growers who live near ponds might have problems with geese. Deer netting seems to work well for geese, too. They are usually reluctant to fly over the fencing!

Using Transplants

Plan ahead so you have the right transplants at the right time. Tomatoes, peppers, and eggplant require transplants to accommodate the succession planting schedule – a schedule you must follow carefully to provide a steady, even flow of produce.

Small quantities of plants can usually be purchased at local garden centers; however, when larger amounts are needed, you should make prior arrangements with local greenhouse operators or plant dealers to ensure availability of the desired varieties at the proper time.

It would be wise to consider the addition of a greenhouse. A small greenhouse combined with a matching slat house can produce a large amount of transplant during the season. All of the information for these buildings is readily available online.



Succession Planting

I made a major mistake in planting my entire one-half acre backyard garden for the past 48 years. As a result, it is contaminated with multiple soil diseases that create problems every season.

In retrospect, it would have been much better to redirect a portion of my garden to grass or small grains each year to control the various soil diseases which now exist. Doing so would have rehabilitated the land to something closer to a sterile state each year.

In any case, the perfect planting site is one in which we can match a tract of fallow, sterile land with an adequate water source and apply the plasticulture growing practices. Most of us will not be able create this ideal scenario, so we must use other available resources. Thankfully, plasticulture adds value and yield to any planting site when properly managed.

If you are fortunate enough to have available space, it is beneficial to allow it to be planted in grass or small grains for three to four years. Our five-acre plan encourages succession planting schemes to provide a consistently balanced flow of seasonal produce for a retail market; growers who support food banks and backyard gardeners; CSA providers; and/or farm-to-table operations.

Now to the growing plan for our five-acre site! Keep in mind that the schedules and divisions of acreage are based on this hypothetical site but can be broken down into any division that fits your needs.

Using six-foot row spacing, five acres will provide 30,000 linear feet of planting rows with allowance for access and drive rows.

The Crops

April 15 has been chosen as the starting date for warm season crops as it is considered the frost-free date for our area. If your frost-free date differs, simply shift the planting dates to the proper date for your planting site.

Growing Tomatoes

The Celebrity variety is a proven performer and a safe choice for openers. There are many good varieties available and you may try to find a better fit, but be careful. Disease resistance is an extremely important part of this choice. Celebrity is a determinate variety and is grown extensively in our area.

Avoid mixing varieties of unknown quality with your main crop. If you want to experiment with other varieties, separate them so that disease spores can't migrate into your main crop and cause you to lose production.

Tomatoes are your most important crop and best source of income. While they provide your best opportunity to make a significant amount of money, you must also plant more profitable crops (i.e. okra, corn) to bring in other customers who will ultimately purchase your tomatoes.

Tomatoes must be harvested 2 to 3 times per week. Harvest all the tomatoes with color, clean them, and store them in a cool place (not in a cooler). They will be ready to sell in 3 to 4 days.

Here are space allocations for tomatoes on the five-acre growing site:

- 8,000 linear feet divided into 4 equal plantings
- Each planting accommodates 1,000 plants
- Plant spacing is 2 feet in row centers

Planting Dates in our area are:

- April 15
- May 10
- June 5
- July 1

A few growing tips for your tomatoes

The Florida weave system is the most popular method of support. It entails driving 4'- 6' stakes between every other plant and stretching tomato twine at planting time to prevent the plant from falling over and forming a "dog leg," which will make it difficult to control. There are videos online showing the process. If possible, buy the Honduras pine-treated stakes. I have some that are 30 years old and have no sign of rot.

Good planning is essential to guarantee availability of transplants. County Farms Nursery in Baxley, Georgia provides transplants for some of our growers. They sell plants in 1,000 plant lots; however, you must order in advance and be ready to plant your tomatoes when they arrive.

Pruning the lower three or four suckers is important. Pay close attention to plant growth and accomplish this task when the largest suckers are six inches long. Multiple testing procedures have produced the same result: Pruning will not reduce the number of pounds produced but will greatly increase the number of #1 tomatoes harvested.

Keep in mind that you will not be successful in growing tomatoes without a disciplined fungicide program. Early blight and late blight are always a threat to tomato growing and could destroy your chances to harvest a full crop. We use a fungicide that has been in production for fifty years, chlorothalonil. It is sold under the brand names Chem-Nut, Initiate, and, in small quantities, Daconil 2787.

Fungicides are a preventive measure and must be applied before disease strikes. You cannot cure a sick leaf! Apply it every 7 to 10 days for acceptable control – and yes, that includes just before rains. If the material stays on the plant long enough to dry, it will zero out the disease spores. If left unsprayed before the rain, the disease spore will multiply rapidly.

For insect and worm control, add an insecticide to the spray tank. We use a permethrin (Chlorothalonil) mixture in the PAR garden. Some growers like to alternate the Chem-Nut with Pristine, another fungicide. This spray mix works for peppers, eggplants, melons, cucumbers, and squash with much success.

Make the planting hole slightly larger than the plant root (2"x 2") and backfill with a good grade of wet fertilized planting mix (1 tablespoon of 20-20-20 per gallon of water). This will get your plants off to a stronger start and result in an earlier harvest.

Wondering about yields? If all fertility, moisture, disease, and insect control needs are met, you can reasonably expect 15-20 pounds of tomatoes per plant.

Adequate and consistent moisture control is absolutely essential to tomato production. Blossom end rot is usually a product of inadequate or irregular water application. Thankfully, drip irrigation provides an opportunity to control moisture at optimum levels at all times.

Increase the total pounds of #1 tomatoes per plant by applying fertilizer when the first tomatoes reach maturity. In a commercial setting, the recommended procedure is to inject 50 pounds of potassium nitrate per 1,000 plants through the fertilizer injection system. Be aware of the need

to run the drip system for at least one hour after the injection process is complete to properly distribute the fertilizer within the root system. Backyard gardeners who do not have injectors and, in particular, growers of indeterminate varieties should apply 5 pounds per 100 feet of 10-10-10 along edges of the plastic strip. The root system will be outside the plastic by this time and will pick up the fertilizer.

Proper harvest practices are important to protect the final product. Tomatoes should be harvested 3 times per week, removing all the fruit that is showing color.



What about my backyard tomato garden?

All of the above information concerns a commercial growing operation. Small backyard growers and community gardens can add indeterminate and heirloom tomatoes to the mix. Some of the very best quality tomatoes fall into these two categories!

Indeterminate varieties continue to grow as long as proper fertility, moisture, and disease/insect controls are present. I am writing this on September 26, 2016, and have had a garden salad for lunch with tomatoes from plants that were transplanted on April 15, 2016 and started to produce ripe tomatoes

the last week in June!

One hundred Goliath plants have produced well over 2,000 pounds of tomatoes in our backyard garden. Some of the tastier tomatoes available fall into this category: Goliath and Big Beef are some of our favorites. They have good disease resistance; they're also strong, productive, and easy to grow.

The main challenge with growing these indeterminate tomatoes is the support system. We stake ours at planting time with a 4' to 5' stake and, when the plants reach the top of the stake, we add an "extension" (a 7' piece of $\frac{3}{4}$ " PVC pipe). There are several options for the extension, including sections of bamboo which are at least $\frac{1}{2}$ " in diameter at the smaller end. The extenders do not need to be driven into the soil – just tape them two or three times to the primary stake.

A word of caution in your variety selection: Use only proven performers. Do not plant Big Early or Big Boy. They were the first hybrids introduced and have no disease resistance.

The heirloom varieties have gained popularity and are relatively easy to grow. Cherokee Purple has won many taste contests. Brandywine is also very popular. Some of my friends have good results with a novelty tomato called Goldman's Italian. It produces a very different looking tomato: pear-shaped with prominent sutures. It has a very good flavor and limited pulp. It has also become a favorite for canning, salsa, and tomato paste.

Growing Squash

Yellow summer squash and green zucchini squash are easy to grow and are always in demand. Grow them from transplants or by direct seeding.

On the five-acre growing site, we allocate 3,000 linear feet of row with six plantings of 500 linear feet. Planting dates are:

- April 15
- May 5
- May 25

- June 15
- July 1

If possible, pursue the first planting of 500 linear feet with transplants and, at the same time, direct seed the second row. Repeat direct seeding as noted above.

The in-row spacing should be 15”-18”, double row, 6” on each side of the drip lines. Squash plants are hollow. If you get them near the drip line where it is very moist, they will rot.

Yellow squash sell much better than zucchini, so a ratio of 4 to 1 would probably be good for starters. The recommended varieties are: Midas II yellow squash and Senator zucchini from Willhite.

The only pest control generally needed before June 1 is to spray an insecticide around the stems at ground level to control vine borers. After June 1st, be alert for the appearance of powdery mildew and/or leaf-footed stink bugs. The standard spray mix of Chem-Nut fungicide and permethrin insecticide at 7 to 10-day intervals will control these pests.

You can continue planting squash throughout the summer, but you must purchase virus-resistant seed for planting after the end of June. Twilley offers several virus-resistant varieties.



Growing Cucumbers

Plant the Dasher II variety for a standard cucumber and Eureka for “Kirby-style” cucumbers. Both have performed well in our experience.

The Eureka cucumbers are extremely popular. Although they are pickling-size, many prefer them for slicing and salads. At 4-5” long, they are crisp and tasty without any trace of bitterness!

Spray them with the standard fungicide/insecticide mix to control cucumber beetles, pickleworms, and powdery mildew. Harvest them at full size as shown in the seed catalog.

Allocate 1,500 linear feet of row, just as with summer squash. Plant 250 feet of row at each planting with in-row spacing of 15” to 18”.

Growing Cantaloupes

One of the most popular items in any market, quality melons are relatively simple to grow when you follow a few sound cultural principles. The same disease/insect control program recommended for tomatoes works well for cantaloupes, too.

Utilize a 7 to 10-day interval application of the fungicide/insecticide mix described for tomatoes. Allocate 4,000 linear feet of row with the first planting on April 15th and subsequent plantings on May 1, May 15 and June 1. Each planting should yield 1,000 melons over a two-week period. Use transplants for the first planting if available.

There are many good hybrid varieties available with the most popular one being Athena; however, all of the newer varieties are bred to have a very short harvest window and accommodate commercial growers.

We’ve had much success with the Super 45, a variety that was hybridized from the PMR45 melon. If you haven’t heard of the PMR45, it was the standard cantaloupe for many years! The Super 45 produces a 4-5 lb., well-netted, attractive melon with outstanding taste. Willhite is the single source for this variety.

The Super 45 also sets fruit over a longer period of time than the other hybrids and has a longer harvest window. Cantaloupes are somewhat fragile and require some special attention. We usually have showers and rainy periods during the harvest season and this requires close attention to the irrigation. Maturing vines have roots outside the plastic and can add too much moisture at the critical ripening time, resulting in stem end cracks that make them unsalable.

Another issue during rainy periods is that water accumulates underneath the maturing melons outside the plastic so that they stick to the soil, leading to cracks in the moist area. A simple solution is to move all the netted melons enough to have them rest on a different area. It does not require much relocation – just enough to have the melon rest on a new spot.

If your cantaloupes are near a habitat that can accommodate field rats, rodents can become a problem. Simply scatter D-Con pellets along the edges adjacent to the field when the melons start to ripen. Fortunately, rats like D-Con more than cantaloupes.

On the five-acre site, the row spacing for cantaloupes is 2 feet with 8'-9' between rows to accommodate the vines.



Growing Watermelons

These are everyone's favorite and easy to grow! Allocate 4,000 linear feet of row. Each 1,000-foot planting should produce 600-700 melons. Aim for 24"-30" of in-row spacing with a row width of 8'-9'. Use transplants for the first planting, if available. Planting dates are:

- April 15
- May 1
- May 15
- June 1

Disease and insect problems are less frequent in watermelons than in cantaloupes; however, it's a good idea to use the same spray program.



There are many hybrid and open-pollinated varieties available. I will offer three from Willhite that should fit most produce market needs. Willhite has been a long-standing, dependable melon breeder for many years, and any of the following three varieties would fill the need for a 15 to 25-lb. seeded watermelon.

1. Legacy – A recent introduction, it has found good grower acceptance. It is an attractive melon with good taste. The seeds are modestly priced as compared to the hybrids and it should perform well for a local growing operation. This variety is only available from Willhite.
2. Dixilee – This is another a Willhite offering that sells well in produce markets. It's a very good tasting melon with strong vine growth.
3. Crimson Sweet – A long-standing favorite that works well in any market, Crimson Sweet has name recognition and is an established favorite variety.

Try the hybrids if you wish, but I believe of any of these three will fill your needs.

Growing Corn

High quality, fresh sweet corn is a favorite item in the local produce market. Three types of sweet corn are available:

1. Normal (SV)
2. Sugary Enhanced (SE)
3. Super Sweet (SH2)

In our area of Georgia, the long-time favorite is the normal white variety, Silver Queen. It has name recognition and an old-fashioned flavor. Many growers have switched to Silver King, which is very similar to Silver Queen. It is an SE variety with increased tenderness and sweetness. It has longer harvest time, longer shelf life, and matures ten days earlier than Silver Queen. Some growers combine them in a single planting for the convenience of a longer harvest. The 10-day maturity interval precludes cross-pollination.

If you are interested in a bi-color variety, both Honey & Cream and Peaches & Cream are acceptable SE varieties. A long-time favorite in the yellow corn family is Kandy Corn. It is an SE variety with wonderful flavor and

good shelf life. It has strong, 7'-8' burgundy-colored stalks and green husks flushed with red.

If you have covered storage available, cut a portion of the stalks at ground level immediately after harvest and stand them up to dry for corn shocks in the fall. The stalks will bring in as many dollars per unit as the ears. Store them upright to dry and to prevent mold.

On the five-acre site, allocate 6,000 linear feet for corn. In-row spacing is 9 inches, double rows. Planting dates are:

- April 1
- April 15
- May 1
- May 5
- June 1
- June 15

Corn earworms are always an issue in growing sweet corn. Control them by applying a permethrin spray at the first appearance of silks. Repeat spraying at 3 to 5-day intervals until silks begin to wilt and dry. The biological control product (*Dipel*) *bacillus thuringiensis* provides some control but requires more frequent spraying.



Growing Peppers

A combination of green, red, and yellow peppers is a good mix for your market. Allocate 500 linear feet for peppers. They will only require one planting between April 15th and May 1st if you care for them properly. Peppers grow best in warmer weather.

The same culture and support system used for tomatoes will work for peppers. Plant 100 linear feet in the yellow variety, “Early Sunstation.” Do not harvest any of these as green peppers. Plant 400 feet in the red variety, “King Arthur.” Harvest 200 feet of these as green peppers and allow the remaining 200 feet to mature to red. Red peppers sell much better than yellow because of the higher level of lycopene.

Assuming proper management, your single planting of peppers should cover the entire season!



Growing Eggplant

Plant 100 linear feet on April 15th and manage them the same as peppers and tomatoes. The Epic variety (hybrid) is a good choice; the small-sized cluster fruits of the Hansel variety are also popular.

Growing Okra

Fresh okra is a customer magnet for your market. Okra is easy to grow, but harvesting it is a challenge. Two plantings should cover the entire season.

Plant 500 linear feet on April 15 and 500 linear feet again on June 1. Plant a single row with 15"-18" spacing. When the second planting comes into production, cut the plants of the first planting off at 15"-18" high to produce new growth and provide a late season supply.

Clemson 80 is the standard variety and performs well in this area.



Growing Beans

Several varieties of beans have been developed the heirloom variety, Kentucky Wonder. The leading varieties are Greencrop (Green Crop) and Kentucky Dreamer, both of which develop a large bush plant with good yields. These varieties retain the Kentucky Wonder taste, plus present a longer, straight pod without strings.

Greencrop is available from several seed dealers. These long (8") flat beans sell out quickly in most markets! Growing this variety is labor intensive as it needs to be planted at two-week intervals.

Plant in double rows, 8"-9" apart, 3 seeds to the hill. Do not thin. The vines grow large, so consider adding short stakes along each bed shoulder with a couple of strands of tomato twine to keep them upright. The typical yield is 5-8 bushels per 100 linear feet.

If you are interested in a round green bean, consider the Strike variety.



Growing Southern Peas

Peas are not a strong income provider; however, if you have unused land, they are an excellent groundcover. Sowing them with a cyclone seeder is the usual process. After preparing the land, sow them on top of the soil and cover them using a smoothing harrow with the discs adjusted to the most extreme angle. Hold the harrow up with the lift so that it touches the soil deep enough to get complete coverage on the surface.

Do not plant peas before June 15. The Pea Curculio, which stings peas and leaves an egg inside the pod, does not attack them if planted after this date. Peas have a short growing season and can be planted until early August. The

planting rate is 50 pounds per acre: Double row, 8” spacing, 3 seeds to the hill. Peas may also be planted on plastic beds cleaned off after earlier crops. Pinkeye Purple Hull is a favorite variety for most growers.



Growing Sweet Onions

The famous short season sweet onions that we grow in Georgia are a perfect match for plasticulture! With all due respect to our friends in Southeast Georgia, the onions we grow in the Piedmont match up well with theirs in every respect.

Plants are available from Dixondale Farm in Carrizo Springs, Texas. This supplier publishes a chart showing proper planting dates for every zip code. For my zip code, the date is February 15th. Each case of approximately 2,000 plants is priced at \$75.00 postpaid. Our typical yield has produced 600 to 800 pounds of cured onions per case. We have great success with the Texas Legend and Yellow Granex varieties.

The culture could not be easier. We prepare 100 feet of black-on-black plastic for every case before the winter rains, generally in October. These plants require extra fertilizer because of the small root system – usually 25 lbs. of mineralized 10-10-10 for every 100 feet. Using a sod roller with $\frac{3}{4}$ x 2” spikes added at 4” spacing, we plant 18 plants per foot.

Two weeks after planting, apply water soluble 20-20-20 at the rate of 1

tablespoon per gallon of water. Repeat this at 2 to 3-week intervals to give the plants an initial boost until the bulbs begin to form. We use a watering can for this operation.

Purple blotch is a disease that attacks the leaves and stops growth. Each of the 14 leaves supports one layer of the onion. The health and vigor of the leaves control the width of the layer, thus determining the size of the onion. Simply adding 1 tablespoon of chlorothalonil to each gallon of the fertilizer water will control the purple blotch fungus.

Hydration is critical in the later season and must be carefully managed. As for harvest and storage, simply follow the instructions furnished by Dixondale. They tell you everything. Green onions at tennis ball-size should be available to match the early Cole crops and potatoes we propose in in a later section.



Growing Potatoes

A special springtime treat is the “new” red Pontiac potato. These are easy to grow on plastic and can be harvested as needed. As harvested, they have a very different taste from those at the grocery store. They have a high level of natural dextrose, which converts to starch after a few days, much like sweet corn and English peas.

The availability of seed potatoes is limited to a short period in February and

early March. After determining the amount needed, follow this process:

A 50 lb. bag of seed potatoes should plant 200 linear feet. Typically sold in 50 lb. bags, you will need to open the bags to expose a sample of the sprouts. If the sprouts are less than ½” long, store them in a warm area and the sprouts will quickly form.

Cut the seed potatoes into 2-ounce pieces (called sets), which will be approximately the size of an ice cube. Each set must have at least one sprout. Store the sets in vented crates or baskets for at least a week to allow the cut sides to form a hard surface. Having the hard surface protects the sets from decay while the root system is being developed.

If you must delay planting for a period of 2 or 3 weeks, the sets will be fine as long as you store them in vented crates where they have air circulation. The ideal planting date is sometime in mid-March.

Cut a 2”x 2” hole in the plastic at 12” intervals in double rows and plant the sets 2” deep with the sprouts pointed upright. The typical yield is 10 to 1. A 50 lb. bag of seed should produce 500 lbs. of potatoes. Harvest the potatoes after you’re certain the beds are dry. Brush the dirt off with a soft brush. This will afford the maximum storage time.

Potatoes should match up well with your Cole crops and the onions as described earlier.



Growing Sweet Potatoes

Sweet potatoes are easy to grow using plasticulture methods with little attention in growing season, save for hydration. The leading varieties are Beauregard and Covington. Scott Farms in Lucama, North Carolina is a grower who focuses on producing disease-free plants. At this writing, typical plant (called “slips”) prices are \$75.00 per thousand postpaid. Slips are usually available in mid-May.

Plant double rows at 12” apart. Be sure plants stand up at transplanting – touching the plastic sheet will cause major damage. Cut off the root end to accommodate this.

Field rats are a problem if you are planting in a site near grass or weed patches. Use D-con pellets around the perimeter to control them. Ample supplies of quality potatoes are available at produce supply markets should you decline to grow these vegetables. These should be added to fall offerings of Cole crops and pumpkins.



An Alternative to the Five-Acre Plan

Not everybody is able to pursue the full five-acre growing plan, and that's ok. There are other ways to generate cash flow from your plasticulture farming efforts. By planting crops as I describe below, you'll be able to begin selling them in mid-May.

The availability of hybrid turnip and mustard green seeds is key to your opportunity. These products represent a major step forward in quality, appearance, yield, and taste when compared to the open-pollinated varieties. I will attempt to schedule planting dates that match them up for a mid-May delivery start.

The major problem with growing these spring crops is site preparation due to wet soil. Here is the solution: Lay 6,000 linear feet of black-on-black plastic mulch in the fall before the winter rain begins (between mid-October and Thanksgiving). This will accommodate the planting of the transplants and the direct seeded crops. Plant the transplants as you usually would. The process involves removal of the plastic on the beds to be direct seeded, leaving the drip tape intact. Using an Earthway seeder, plant a double row with 6" on either side of the drip tape.

These hybrid seeds are much more expensive than open-pollinated seed, but they are absolutely worth the investment. Purchase the following transplants from Country Farms Garden in Baxley, GA for planting on or about March 15:

- 500 broccoli plants
- 500 cauliflower plants
- 2,000 collard plants
- 1,000 cabbage plants

Purchase the following seed for planting on or about March 15th from Twilley Seed:

- ¼ lb. - 3045u Lacinato kale
- ¼ lb. - 4654 Savanna mustard
- ¼ lb. - 4654 Southern Green turnip greens
- ¼ lb. - 4644 Royal Crown turnips

From Johnny's Seeds, purchase:

- ¼ lb. - 706 Hakurei turnip
- ¼ lb. - 3926 Siberian kale

Half of these seeds will be needed for fall planting on or about Labor Day. Any leftover seeds may be kept for up to two years if properly stored.

To reduce the labor costs on the mustard and turnip greens, simply pull the mature (8" tall) plants, chop off the root, and bundle them like collards. Backyard gardeners can harvest individual leaves if re-growth is desired. Plant a second crop of the greens, mustard, and kale 2 to 3 weeks after the initial crop.

Plant 1,000 linear feet of the Southern Greens on or about March 15th at the same time. Plant 500 linear feet of Siberian kale, 500 linear feet of Lacinato kale, 500 linear feet of Royal Crown turnips, 500 linear feet of Savanna mustard, and 500 linear feet of Hakurei turnips – all at two rows per bed. If you have space left, perform a second planting of Southern Greens.

Also consider selling tomatoes from Florida. Growers in the Sunshine State start delivering large amounts of vine-ripened tomatoes to the local wholesale produce market in mid to late May. These tomatoes are not on a par with our local ones, but they are acceptable and sell very well. Add the

tomatoes to your kale, cabbage, collard, turnip greens, broccoli, onions, and new potato display to attract customers at the start of the season!



Containers and Storage

If you plant a substantial portion of what is included in the proposed five-acre plan, you must provision a matching amount of harvest containers, storage boxes, and bins. Check with the produce manager at your local supermarket. The conversation could result in lots of free containers!

At some level of production, you will also need a cooler. The manufactured coolers are expensive and difficult to set up. An alternate plan is described at storeitcold.com. At that site, you will find instructions on how to locally fabricate a simple insulated building cooled by a common window air conditioning unit! The company sells a replacement temperature control unit that can reduce the cut-off temperature to acceptable levels for vegetable storage.

A couple of our growers have installed these units and they work very well. The cost is a small fraction of what you would pay for a manufactured commercial cooler!

Weed and Grass Control

The area between the plastic-covered beds is difficult to keep free of weeds and grass. Growers use various methods of weed control, none of which are totally effective. It usually takes a combination of efforts to gain total control over weeds and grass.

In 6' row spacing, the area is usually about 36" wide. Some growers use pre-emergent herbicide, some by tilling and others by a mop saturated with Roundup solution. It is important to keep this area weed-free to prevent disease spores and insects from propagating. It also makes plastic removal easier if no roots are allowed to penetrate the covered plastic shoulders.

The edgers shown on page 63 of the 2017 Berry Hill catalog show great promise and should be an asset in the control of weeds and grass between rows.



The Money Thing

It is impossible for me to quantify the capital expenses for the initial setup because every site is different; however, I can help with the direct operating cost. Here is the material list for the five-acre growing site:

2 Tons Super Rainbow 10-10-10 or equivalent	\$1,200.00
10 Gallons Chlorothalonil (fungicide)	\$350.00
5 Gallons Permethrin (insecticide)	\$200.00
3 Gallons TriTec (matricide)	\$150.00
5 lbs. Dipel wettable powder (biological control)	\$75.00
Transplants * (tomato, pepper, eggplant)	\$700.00
Seeds	\$800.00
Seed potatoes and onion plants	\$500.00
30,000 feet plastic mulch	\$900.00
30,000 feet 8 Mil. drip Tape	\$600

These are the major expenses, but you will certainly have others. The major expense will be labor, and this is hard to quantify. My best estimate is that you will require 2,000-2,500 work hours during a season. In our PAR garden, we have no labor cost and our typical direct cost is less than ten cents per pound of produce.

Some Money-Saving Tips

Do not invest in a major underground PVC water supply system. The aboveground flat tube and oval hose supply lines work well. If having these on top of the ground is a problem, simply make a shallow furrow with a single-foot sub-soiler or a middle buster and bury it deep enough to get it out of the way. The Berry Hill catalog has all the information you need about this arrangement.

Before spending large amounts of money on an underground power cable, consider using a solar-powered fence charger. You should also investigate using a battery-charged timer.

Disease and Insect Control

A major barrier to the success of this project is yield loss due to diseases and insects. As mentioned earlier, we are using a simple approach in our PAR garden that involves one fungicide (chlorothalonil) and one insecticide (permethrion). We apply these in a mix, as needed, to all our main season crops. Chlorothalonil has no time-before-harvest requirement. Permethrion has no time-before-harvest requirement on most crops we grow either; however, several crops require a one-day limit before harvest.

If you choose to plant the early and late crops, it will be necessary to add a miticide (TriTek) and a biological control (bacillus thuringiensis), sold as Dipel, to control soft-bodied insects and cabbage looper caterpillars. We use organic products when applicable, but find it necessary to use conventional methods in some areas to protect our yield.

We know we can produce safe, healthy food using conventional insecticides as recommended in the University of Georgia Home Gardeners Disease and Insect Control Guide. It is important to recognize that all plant diseases attack the underside of the oldest leaves first and that most insect damage occurs in the same area. We recommended the Hudson battery-powered pump sprayer because it produces a constant high pressure (60PSI), which will produce a finer mist and move leaves during the spraying process. The spray material must be approved for the specific crop. What's more, all mix ratios, application rules, and time-before-harvest guidelines should be observed. Also, all operator safety measures must be observed when applying these recommended products. Pay careful attention to the information on the product labels and the UGA guide.

Here are some observations about disease and insect problems:

- Square vine borers attack plant stems at the soil line in every planting.
- Leaf-footed bugs, stink bugs, and pickleworms start to appear in mid to late June.
- Pickleworms attack all cucurbits except watermelons around July 1. This is a “wipe-out” pest that must be controlled by preventive spraying methods.
- Cucumber beetles attack cantaloupe and cucumber vines just above the soil line when the plants are very small. They transmit a virus that kills the plants before they are mature.
- Corn earworms attack most ears of corn in early plantings and attack more aggressively as the season progresses.
- Aphids attack all the Cole crops and can be controlled by the organic miticide TriTec.
- Cabbage loopers attack cabbage, broccoli, and cauliflower. These pests make products unsuitable for sale. *Bacillus thuringiensis* will control them.

Every insect will attack eggplant. The standard spray mix will protect those vegetables as well. Be sure to locate a farm chemical supply for these purchases. The local garden center will not stock them. We drive ninety miles to A.M. Bickley Chemical, Inc. in Marshallville, Georgia, and it is well worth the drive.

Closing Thoughts

There is an old adage that states, “The best fertilizer you can apply to the land is the footprint of your own boot.” In other words, it is absolutely necessary to spend time checking all of your crops.

We must keep a close eye on the irrigation system, watch out for insect and disease problems, and be on the lookout for any signs of fertility issues. Learn to use the two best tools you will ever possess: your eyes. Train your vision to recognize how a healthy plant should look, including leaf color and vigor.

There is much information online that shows disease symptoms and the presence of insect damage. You can't remedy a problem unless you recognize its existence.

Make a work calendar and try to stay on schedule. The time required to accomplish any of these routine tasks will multiply if you fall behind.

Be Joyful and Thankful!

Be joyful in the privilege of watching God's handiwork in the conversion of a seed the size of a pencil point to a bucket full of wonderful tomatoes.

Be thankful that He allows us to help a little with the process.

Be joyful in the privilege of sharing our bounty with friends, family, and especially the needy.

Be thankful that we have been provided the resources to make others' lives better.

We are all leaving a footprint. Our legacy will largely be determined by the demonstration of our faith and by how we treat other people.

Otis Lester Bray – January 18, 2017



Further Reading

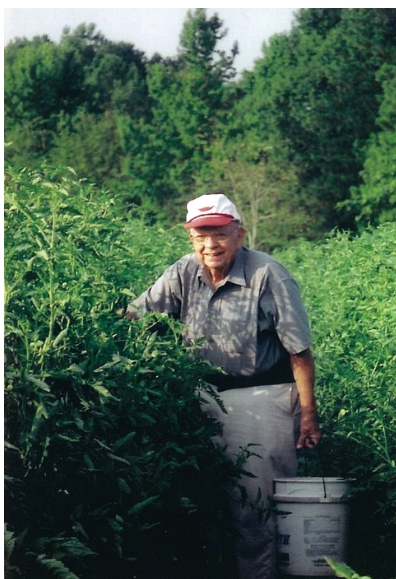
[Myers, Jeff, "Starting a Fruit Orchard in the Atlanta Area", 2014](#)

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About the Author

Otis Lester Bray is an 88-year resident of Fayette County, Georgia. A veteran who spent 50 years in the aviation industry, he has worked as a part-time farmer and gardening hobbyist all his life. He started working with the Fayette County chapter of Plant-a-Row for the Hungry in 2008. Through his interactions with that group, he was inspired—and encouraged—to finally put to paper his vast knowledge of farming in the Georgia Piedmont.



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