PLANTS
Seeds

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SECTIONS

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INTRODUCTION

Raising a profitable crop begins with selecting the right seed product to plant on your farm, this can be done by identifying important characteristics for a successful crop. Just as no two farms are exactly alike, neither are the fields in which you'll be planting. You need to understand the field conditions and potential environment you expect a plant to grow in. Then, select varieties that meet those expectations.

How To Get Started

It is important to remember that different factors on your farm such as soil, location, weather, and climate can make it difficult early on in your career to understand what seed will perform well on your farm. Determining various plant attributes can help navigate factors outside of your control that will inevitably affect your farming season.

Important attributes to include when deciding what to grow include: growth factors that focus on plant health and survivability, harvest condition and quality, tolerance or safety concerns when using pesticides, and even disease resistance or susceptibility.

Another consideration is to identify when you need a plant to reach maturity. Many plant varieties will list maturity by at least one of two terms: ***relative maturity (RM)*** and ***growing degree days (GDDs)***.

Relative maturity focuses on harvest maturity, or when a crop can be harvested with minimal loss or damage. Growing degree days focus on thermal accumulation, or heat units, needed for a plant to reach reproductive maturity. Reproductive maturity can often be reached before relative maturity. Often times, the importance of relative maturity or growing degree days is dependent on when crops will need to be harvested. Beginning farmers who raise field crops often focus on relative maturity to meet standard grades for grain. Alternatively, vegetable growers may rely on growing degree days to harvest crops for fresh market sales.

When selecting what to plant, it helps to start with the end in mind. Marketing is a very important component of owning and operating a farm business. It is especially important when considering what to produce. For example, beginning farmers should think about who they will be marketing their crops to, how saturated the market is in their region, and the value proposition they have for the marketplace.

SECTION 1

FIELD CROPS

There are typically seed guides available from seed companies for field crops. These guides, while useful, can be a little tricky to understand if you aren't used to looking at them because every company sets them up slightly differently. Even with different set ups most companies include some common information:

Primary Considerations

- Growth characteristics
- Harvest timing, condition, and quality
- Costs and their impacts (i.e., planting, harvest)

Process for Getting Started

Variety numbering systems are the conventions by which companies name their different seed options. These conventions may use a combination of abbreviations for their company name, relative maturity (RM) numbers, and possibly trait information to identify varieties. An additional characteristic of a numbering system is it may the trait package, that is designed to protect the plant against specific pesticide damage.

Seed guides offer information on a number of different plant attributes. Often these attributes are accompanied by a rating system An example is a 1-9 rating system, with 1 being the best rating, but yet for another company 9 may be the best.. Some companies may forego numbers and instead use descriptive terms such as poor, good, very good, and excellent. It is important to understand which rating scale the company is using to define growth characteristics and other attributes.

Selecting the right seed for your farm starts and stops with profitability. You want to select varieties that are adaptable and will maximize yields across all acres. The economic returns related to seed and harvest costs are equally important, these include seed purchases, test weight, moisture shrink loss, and drying charges.

Disclaimer: For a specific list of resources in the above description, view the Necessary Resources area of this section.

SECTION 1: FIELD CROPS

COMMON QUESTIONS

01 Are days of relative maturity the same as counting calendar days from planting?

Relative maturity is the days needed to reach harvest maturity or when grain can be harvested with minimal loss or damage. Under ideal field conditions, harvest occurs when grain has naturally dried to a desired moisture content. However, weather can impact how long it takes to reach ideal moisture levels. Temperature, humidity and water availability can delay or speed up the drying process. Due to weather, relative maturity days should not be considered the same as calendar days from planting. For more information, visit the MSU Extension presentation on Optimal Maturity Selection in Corn and Soybeans (https://www.canr.msu.edu/agronomy/uploads/files/2021_Optimal_Maturity_Selection_in_Corn-Soy.pdf).

02 What are trait packages and how do they work?

In addition to pesticide use and disease ratings, seed varieties may be genetically modified with additional management attributes. When a plant is modified, and its resistance is not naturally occurring this is referred to as genetically modified organisms (GMOs) or simply "traits." Plants with genetic traits may be able to provide their own protection against pests, injury from pesticides, or environmental stress conditions. For more information, visit the Handy Bt Trait Table for U.S. Corn Production (https://www.texasinsects.org/bt-corn-trait-table.html).

03 Does a higher disease rating mean I won't need to use fungicides on my plant?

A better rating indicates the plant is less susceptible to disease development and injury, which means limited impact to plant health and yield. Fungicides may still be needed if environmental conditions favor disease presence or injury. Although a lot of data is not available on each disease, a general rule of thumb is that there is a higher chance of return on investment (ROI) when conditions are favorable for disease development. To learn more about diseases and management tips, visit the Crop Protection Network (https://cropprotectionnetwork.org/).

04 Why is planting population important when choosing seed to purchase?

Population density in a field is important to your decision when comparing seed options. Depending on growth factors, soil types and environmental conditions, higher or lower planting rates may be needed for a specific seed variety. In some cases, seed may be versatile and can be planted at different planting rates, depending on environmental conditions. Ultimately, you need to know the population options that go along with a potential seed purchase to identify the best fits for your fields. Planting rates also affect your overall cost per acre of seed planted. For example, a seed variety with a lower price per bag may have a higher cost per acre depending on the chosen planting rate. To learn more about planting considerations, visit the MSU Field Crops Virtual Breakfast session recording on Corn and Soybean Planting Considerations (https://www.canr.msu.edu/videos/corn-and-soybean-planting-considerations-1).

05 How do harvest costs factor into selecting what seed to plant?

Harvest time costs can also be helpful when comparing seed options. Commercial grain buyers will grade sold bushels based on a number of factors. Factors can include test weight, moisture content, kernel damage, heat damage from drying, and even non-grain or foreign material. Grain that is sold without meeting these standards is discounted by fee or reduced bushels. The most commonly used in seed selection is to look for better test weight and moisture ratings. For an example of the impact of harvest factors, visit Grain Test Weight Considerations for Corn from Purdue University (https://www.agry.purdue.edu/ext/corn/news/timeless/TestWeight.html).

SECTION 1: FIELD CROPS

RESOURCES & PARTNERS

Necessary Resources

Research & Recommendation Resources

- **MSU Field Crops website**: Source of research-based crop production recommendations and resources. Assistance is accessible through educational programs, fact sheets, bulletins, articles, websites, and individual contacts (https://www.canr.msu.edu/field_crops/index).
- **Bulletin E-3430: How to Read a Seed Guide (Corn Edition)** (Michigan State University Extension at https://www.canr.msu.edu/resources/bulletin-e-3430-how-to-read-a-seed-guide-corn-edition)

- **Handy Bt Trait Table for U.S. Corn Production** (authored by Chris DiFonzo, Michigan State University, at https://www.texasinsects.org/bt-corn-trait-table.html).
- **Crop Protection Network:** Provides unbiased, collaborative outputs on important issues affecting crops in the United States and Canada (https://cropprotectionnetwork.org/).

Educational Program Events

- **MSU Extension Virtual Breakfast:** This free weekly series for farmers and agribusinesses focuses on a wide array of relevant field crop pest and crop management topics during the growing season.
- **MSU Extension Field Crop Webinar Series:** An educational program where participants learn how to enhance their corn, soybean, small grain and forage production systems and have an opportunity to ask questions of MSU agriculture experts.
- **MSU Extension Crop and Pest Management Update Meetings:** Annual, in-person meetings held between January and February to help producers and agribusiness professionals prepare for the upcoming growing season.

Partners

- **Michigan Corn** – https://micorn.org/
- **Michigan Soybean Committee** – https://www.michigansoybean.org/
- **Michigan Wheat Program** – https://miwheat.org/

SECTION 2

VEGETABLES

Vegetable seeds are sold by seed breeders, or their partnering distribution companies. Open-Pollinated (OP) seeds can also be sourced directly from other growers through various exchanges. The plants that come from OP seeds will produce seeds that remain true-to-type as long as you can hand-pollinate or isolate flowers by time or space. When maintained for about 50 years, an OP seedline is considered Heirloom. Plants that come from hybrid (F1) seeds will not produce true-to-type seeds.

Primary Considerations

- Not many breeding companies are set up to sell directly to growers. They tend to focus on a selection of vegetables, and a diversified grower would not find everything they want with one breeder. Often it is best to go through a distributor that manages a portfolio of varieties of all types of vegetables from the breeders. It is common to buy more than one distributor.

- A good distributor catalog will include pertinent information, such as full color pictures, maturity times, hybrid/OP status, and disease resistance. An indication of the best planting window is also helpful. There are several planting windows throughout spring, summer, and fall. As an example, certain varieties of broccoli are better for the spring plant-to-summer harvest slot, and others are better for the summer plant-to-fall harvest slot.

- Several different types of seed treatments are offered for different situations, which can drastically affect cost. Beans, pumpkins, cucumbers, and corn are large seeds that are commonly direct-seeded into field soil with a protectant fungicide and insecticide coating. Small or irregular-shaped seeds, such as onions, carrots, and various leafy greens, are commonly coated with clay – a process called pelleting – to make them a more uniform size and shape for accurate planting. Sometimes these cosmetic coatings can include a fungicide or insecticide. It helps to ask the seed distributor. Seed priming is a process that pre-germinates the seed for quicker emergence before it is shipped to you, but it also reduces its shelf-life. Primed seed should be used within one season.

- Will you direct seed or transplant? Oftentimes transplanting requires less seed. If transplanting, the most commonly used cell-tray size for vegetables is a 72-cell tray. A light is a must for starting inside, and a germination chamber is helpful to get seeds up fast. A germination chamber adds heat and holds moisture, such as an electric tray warmer and lid. An old refrigerator with shelves and a crock pot with water in it for heat and moisture is a clever hack to get seeds to crack within a couple days. For chambers that exclude light, you must remove trays and place them into a place with light before the plants fully emerge to keep them from growing pale and stretched.

- Asparagus, rhubarb, horseradish, garlic, sweet potatoes, and potatoes are not commonly planted from true seed. Instead, they are planted from pieces of roots, stems, or bulbs. However, asparagus and rhubarb seed are readily available. Asparagus takes so long to develop into a harvestable plant that growers are best served by planting one-year old crowns. Rhubarb seed is only available for OP varieties, such as Victoria. Most other varieties are hybrids and must be cloned by root cuttings.

Process for Getting Started

- Grab a bunch of catalogs and read them over the winter.
- If you intend to save seed, read up on population, isolation and pollination requirements.
- Read up on field-seeders and transplant tray setups.

Disclaimer. For a specific list of resources in the above description, view the Necessary Resources area of this section.

SECTION 2: VEGETABLES

COMMON QUESTIONS

01 How much seed do I need?

If you have never grown a particular vegetable before, figure out your area in square feet or acres. Then reference a plant population table found in the Knott's Handbook for Vegetable Growers resource below. If you have some idea of your preferred dimensions between plants, multiply that by the full length of your row, and the number of rows to figure out the number of plants you need. If you are direct-seeding you can then buy 1.5x-2x that amount and seed with some doubles and get a reasonable population that may require some thinning. If you are transplanting, you can buy less than 1.5x more seed and seed with more precision into trays.

02 What seed coatings are worth it?

Some vegetables have pests that attack them when they are most vulnerable at the cotyledon stage. Onions, cabbage, beans, corn, pumpkins and squash are all attacked by fly maggots when planted early in the season and insecticide seed treatments are helpful in this planting window, but not so much later on. Similarly, fungicide seed treatments are most helpful in the early season when soil is moist, and rain is frequent.

If you seed with equipment that attempts to singulate seed, such as Jang seeders, it can be helpful to invest in pelleted seed. The more uniform shape and size makes precision equipment work even better.

03 What seed equipment should I use?

New vegetable growers should start small; with the best hand-push equipment they can afford. Some units can be modified to be pulled by tractors if you see that in your future. The best all-around seeder is a Jang or one of its copycats. They are small, lightweight, accurate, and adjustable by hand. They operate with plastic rollers which can be 3D printed and can be retrofitted to a toolbar for multiple rows that are spaced uniformly. A cheaper option with similar accuracy (for large seeds) is an Earthway push seeder. A similarly priced option, the Cole Jr. seeder, will plant any sized seed imaginable with very little adjustment, but it lays them as a dribbled line that needs thinning later.

04 Is this genetically-modified (GMO) seed?

There are very few genetically-engineered vegetable seeds, and most require a special agreement for intellectual property protection. Some GMO sweet corn share genetics with their field corn counterparts, conferring caterpillar-killing compounds, and resistance to certain herbicides. There are some zucchini and summer squash that are genetically-modified to suppress virus symptoms transferred by aphids, and some potatoes that resist browning after cutting. Most recently an OP tomato has been developed with traits from snapdragons to create a purple cherry tomato that has increased vitamin content and a purple color all the way through the center of the fruit.

05 What if I can't plant right away?

Most vegetable seeds will last two years with minimal loss of germination potential. However, onions lose a lot of viability within two years, and by year five most vegetables will have an unacceptable germination rate. Storing seeds for the long haul will require air-tight storage containers and a freezer. For vegetative materials, like sweet potato slips, it helps to time their delivery with your anticipated planting window, but they can be held for a couple days wrapped in moist newspaper out of sun and away from extreme temperatures. Asparagus crowns, rhubarb, and horseradish root cuttings can be held in cool moist (but not saturated) conditions for several weeks. Potato tubers and garlic bulbs can hold well in most ambient temperature rooms for a couple weeks. If obvious mold symptoms can be seen, it is best not to plant them.

SECTION 2: VEGETABLES

RESOURCES & PARTNERS

Necessary Resources

- **Seed saver's exchange saving guide**
- **Knott's Handbook for Vegetable Growers** Table 2.3 (p 62), Table 3.7 (p 113), Table 3.9 (p 118).
- **Stoke's Seed**
- **Rupp Seed**
- **Seedway Seed**
- **Clifton Seed**
- **Rispens Seed**
- **Johnny's Seed**
- **Territorial Seed**
- **Baker Creek Seed**