



Issue **02.** **Family Sustainability**
Introduction

Key Points

- Family Nutritional Needs
- Plant Selection
- Land Preparation
- Planting & Maintaining
- Food Security

Feeding yourself or others is a responsibility shared across the world. Many people choose to complete this task by purchasing from prepared food venues, while others buy from whole food outlets. Although these practices are not inherently bad, have you ever considered growing the food for your family? In some countries, this is the only option to gather food. In the following document, the Center for Agriculture & Food Security has compiled resources to help you learn how to grow enough food to sustain a family by using kitchen garden style plantings. Family sustainability focuses on your family’s nutritional needs, plant selection, land preparation, planting, and maintaining your garden to enhance your family’s food security.

Once all these areas have been investigated and considered, the opportunity to enhance your level of self-sustainability is available. Growing your own food can promote community, a healthier lifestyle, and a feeling of accomplishment.



Human Nutritional Needs

It is important to evaluate what you grow based on your family’s nutritional needs. Every person has different nutritional needs depending on a variety of factors.

Below, Table 1 lists the basic needs per day of an average child (1-8 years old), a young adult (9-18 years old), and an adult (19+ years old) for proteins, carbohydrates, fiber, and fats (Mahan et al.).

The nutrition provided by your crops is essential to the health of your family. It is equally important to select crop varieties and quantities based on the preferences of your family/community. This will ensure the produce is enjoyed and consumed.

Table 1

Children 1-8 yrs.	DRI* per day
Protein	13-19 grams
Carbohydrates	130 grams
Fiber	19-25 grams
Fats (1-3 yrs.)	30-40% kcal
Fats (4-8 yrs.)	25-35% kcal
Young Adult 9-18 yrs.	DRI* per day
Protein	34-52 grams
Carbohydrates	130 grams
Fiber	26-38 grams
Fats	30-35% kcal
Adult 19+ yrs.	DRI* per day
Protein	46-56 grams
Carbohydrates	130 grams
Fiber	21-38 grams
Fats	20-35% kcal

*Dietary Reference Intake



Plant Selection

Different areas of your garden should be used for different types of crops. By doing so, you will ensure having a harvest almost year-round. Likewise, crops contain various amounts of macronutrients (proteins, fats, and carbohydrates) which we then consume. Choosing crops that produce the macronutrients your body will need will allow you to optimize this space. Selecting specific crops and quantities is where this process can become complex. There are many opinions on which plants are higher in nutrition and can be sustainable in a garden year-round. By evaluating nutritional needs and preferences with the information in Table 1, you can select your specific crops. *How to Grow More Vegetables* by John Jeavons recommends planting according to a 60/30/10 design plan. In this, 60% of crops should be carbon and calorie crops, 30% should be high-calorie root crops, and 10% should be vegetable crops for vitamins and minerals. In this case, carbon and calorie crops can be defined as crops with a high amount of dietary calories and carbon-containing material that will be used for composting nutrients back into the soil (Jeavons). High-calorie root crops refer to crops that contain a plentiful amount of calories stored in the plant parts underground. Crop rotation is essential to the health of the soil. It is ideal to plant a type of crop in a different area each year, with a 3- to 4-year rotation. This helps to interrupt pest and disease cycles and improves soil health by increasing biomass from different crops’ root structures.



Table 2 is a list of common crops that are used in these categories (Jeavons).

Table 2

<p>60%</p> <p>Carbon and Calorie Crops</p> <p style="text-align: center;">↓</p> <p>Grains: wheat, cereal rye, oats, barley, corn, triticale, sorghum, amaranth, quinoa, etc. Sunflowers Filberts Raisins Fava Beans</p>	<p>30%</p> <p>High-Calorie Root Crops</p> <p style="text-align: center;">↓</p> <p>Leeks Garlic Sweet Potatoes Jerusalem Artichoke Parsnips Potatoes Salsify</p>	<p>10%</p> <p>Vegetable Crops</p> <p style="text-align: center;">↓</p> <p>Beans Cassava Turnips Peanuts Rutabagas Onions Spinach Lettuce Squash Tomatoes Carrots</p> <p style="text-align: center; background-color: #c6e0b4; padding: 5px;">Contains similar amounts of each nutrient.</p>
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Plants should be selected based on plant growth requirements, seed availability, and your family’s nutritional needs. In addition to these items, you must factor in what you will need to provide a self-sustainable future for your family. This should include immediate needs and long-term supplies. Remember that you are not limited to the crops in this document; choose the crops that are best suited for your self-sustainable goals. Perhaps your region does not have suitable conditions for Jerusalem artichoke (a root crop with tubers similar to potatoes). Choose some familiar crops, but also do your best to incorporate crops that will allow you to maintain an ideal 60/30/10 ratio as suggested in Table 2.



Human Nutritional Needs

The amount of land needed for a sustainable garden can vary for each family depending on how much food needs to be grown. Whatever the case, *FAITH Gardening* lists a general size that should be able to adequately support a family of six (FAITH stands for Food Always In The Home). The ideal space would be “approximately 96-100 square meters and commonly has a dimension of 6 x 16 meters.” This is comparable to around 1,050 square feet or an area of 35 x 30 feet. For a base calculation, a space of 16 square meters or about 170 square feet per person is recommended. Depending upon your family’s size, you may need more or less space using the base calculation.

Metric - Plot Size Example Calculations
Family of Four: 16 meters x 4 = 64 square meters
Family of Six: 16 meters x 6 = 96 square meters
Family of Eight: 16 meters x 8 = 128 square meters
U.S. Standard - Plot Size Example Calculations
Family of Four: 52 feet x 4.33 = 225.2 square feet
Family of Six: 52 feet x 6 = 312 square feet
Family of Eight: 52 feet x 8 = 416 square feet

According to *FAITH Gardening*, the best way to maximize harvest is by separating your garden into three main divisions. The three should consist of early-maturing vegetables, semi-annual vegetables, and annual vegetables. With this practice, you will have a greater variety of crops, and their harvesting times will overlap one another. Furthermore, only plant one-half of each section at first, leaving the other half for relay planting. Don’t plant the second crop until the first crop is closer to maturity, then plant the second crop into the first crop.

Relay planting ensures you can use the available space to yield products year-round. For more information, see *FAITH Gardening* (pp. 12-17, 34) or the *How to Grow More Vegetables* master charts (p. 141 and following).

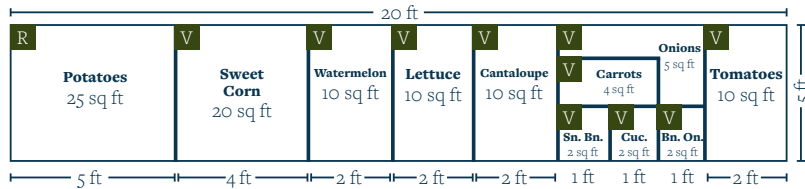


It is also vital that you pick a good location for your garden. The most important things to check for are water source availability, sunlight, wind, and soil quality. Water is essential for plant growth in addition to sunlight for plants to undergo photosynthesis. Gardens should ideally be placed in full sun if possible. Fruits and vegetables should get around 7-11 hours of sunlight daily. Remember, wind could potentially damage your crops; therefore, natural windbreakers (trees, other vegetation, hills, etc.) are preferable to prevent damage to crops. Lastly, drainage options will help during the rainy seasons so that the crops do not drown. Use a slight slope or dig channels around the area to help with draining. Without these elements, your crops may not grow to their full potential and fall short in their yield rates.

Table 3a

Bed 1 - Vegetables

Main Growing Season — June 21 to September 30



Bed 1 - Compost Crops

Cool Weather Growing Season — October 1 To May 20



Maps of Beds (not in scale)

The images shown in Tables 3a and 3b provide sample garden plans as shown in *How to Grow More Vegetables* (Jeavons), including duplicate beds for rotation. Crops may include potatoes, sweet corn, carrots, and compost crops (crops of high biomass yield to decompose and create compost). Compost crops for the winter season may be various legumes, grasses, and hardy grains. Likewise, you could follow relay planting to ensure you are harvesting all year.

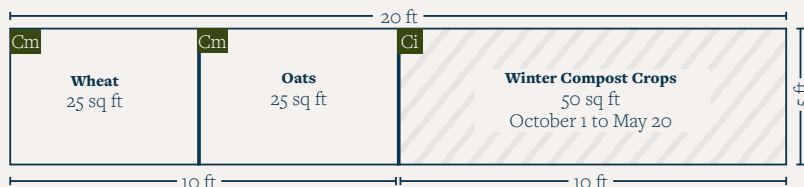
Planting & Maintaining

Once you have selected your site and made a plan, it is time to start preparing the soil.

Table 3b

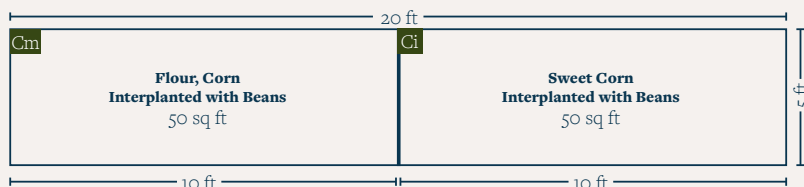
Bed 2 - Grains and Beans [Winter 60% Crops]

Cool Weather Growing Season — October 1 to May 20



Bed 2 - Corn and Beans [Summer Compost Crops]

Main Growing Season — May 21 to September 30



As we mentioned in Bulletin 01, Plant Nutrient Basics (see the bulletin for details), a soil test should be used to identify the available nutrients in the soil. After you have received the results of the test, you can then determine a fertilization plan. (See Washington State University’s publication: *A Home Gardener’s Guide to Soils and Fertilizer* for more information, located in References).

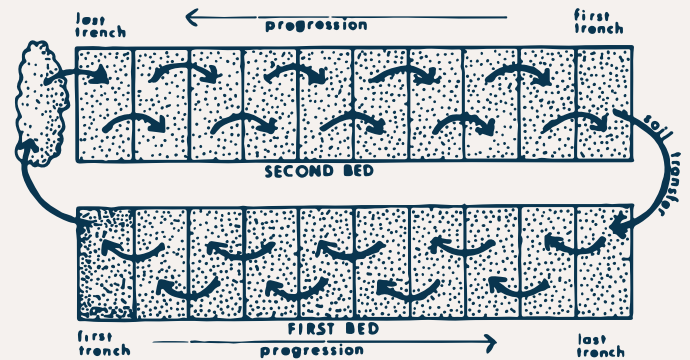
After the soil nutrients have been identified, it is now time to start digging in ... literally! Double digging is one of the best practices for loosening the soil for better planting and plant growth. The next page identifies some basic steps to follow when completing a double dig per 100 square feet or 9 square meters (Jeavons).



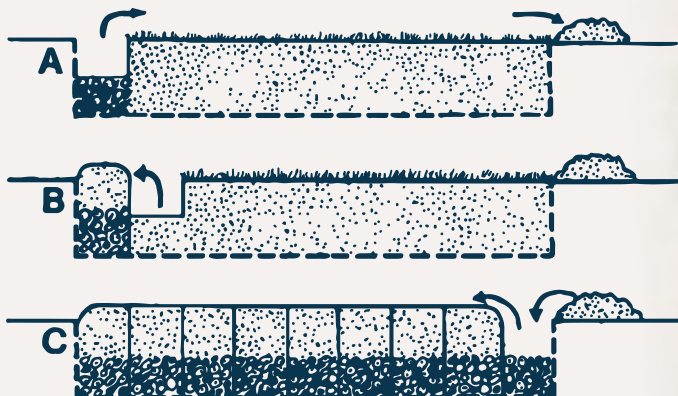
Double Dig Instructions

Follow these steps when completing a double dig per 100 square feet or 9 square meters (Jeavons). This will help to increase soil health and increase rooting depth. It could take two or three seasons to meet all process steps.

1. Evaluate the moisture of the soil. If dry, water before digging. Soil should be consistently moist but not saturated.
2. Loosen the top layer of soil about 12 inches deep, forming a trench, and remove any present plant material including any weeds or their roots.
3. Check the soil moisture again; you may need to water it more. If there are large clumps present in the soil, you may choose to wait two days (while continuing to water) and allow nature to help break up the ground.
4. Remove the upper part of the first layer and store it away for later. It can be used as compost, flat soil, or to replenish the last trench.
5. Loosen the soil 12 inches below what you have just removed.
6. Move on to a second trench, remove the upper part of that trench, and push it forward into the top of the first trench.



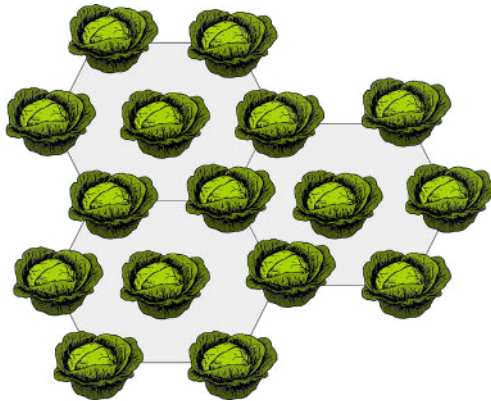
7. Using the spading fork again, loosen the area 12 inches below the remaining soil in the second trench.
8. Continue this process for the remaining trenches. After every 3-4 trenches it is a good idea to rake the ground to ensure the entire area will be a relatively level height.
9. Finally, after you have moved the upper layer of the last trench and loosened the bottom soil, add the extract from the first trench to the top. Proceed to rake the entire area and add any desired compost or fertilizers, embedding them 2-4 inches deep.





With a little bit of rake work, the garden is now ready to plant! You can choose to either sow in seeds or plant seedlings. If using seeds, you will want to plant them at a depth approximately twice as deep as the size of the seed. Then, use fine soil to cover the seeds to simulate nature's process.

Additionally, it is important to get the spacing correct when you are planting. Plants should be planted in a "diagonally offset



or hexagonal spacing pattern with an equal distance" between any two plants (Jeavons). This can also be seen in the image provided. For specific instructions on how to plant specific plants, see the *How to Grow More Vegetables* master charts beginning on page 141.

As you care for your garden, maintain appropriate moisture levels. Be sure to pull weeds and keep watch for disease or pests in your garden, and adjust accordingly. For more information on combating these problems, consult "Integrated Pest Management" in *FAITH Gardening* on page 23. A future Center for Agriculture & Food Security bulletin will focus on practices to enhance your harvest and store the crops you have learned to cultivate!

Planting & Maintaining

In conclusion, growing a garden to sustain your family is possible. It takes hard work and dedication, but the reward is plentiful. The family sustainable garden is achievable by following the suggestions provided within this document; family nutrition, plant selection, land preparation, planting, and maintenance. With effective growing strategies, you can be successful with production year-round. Most importantly, start the adventure of gardening today! Grow where and what you can even if it is one tomato plant in a container. As you begin your adventure, connect with others in your community who are gardening and learn together to increase your ability to supplement your family's food needs.

Being able to enhance your production of food gives a sense of great accomplishment and security. It may require hard work and diligence, but the outcome will reward your efforts.





References

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