

# Solar Pathways for Farmers

## Tree and Shrub Nursery

### 1. Goal Setting and Market Research:

- Define Your Vision: Establish your long-term goals for the nursery. Do you plan to specialize in native species, fruit varieties, or a combination?
- Market Analysis: Research the demand for trees and shrubs in your region. Identify potential customer segments (landscapers, developers, individual homeowners) and analyze market prices.

### 2. Choosing Species and Preparing the Land:

- Plant Selection: Thoroughly research tree and shrub species suitable for your climate zone and target market. Consider factors like growth rate, mature size, and maintenance requirements.
- Location of Planting: Develop a plan specifically on how you will deal with potting planting

### 3. Propagation and Cultivation:

- Propagation Methods: Familiarize yourself with various propagation techniques like seed propagation, cuttings, grafting, and layering. **SEE PROPAGATION TECHNIQUES BELOW**
- Seed Acquisition or Procurement: For seed propagation, source seeds from reputable suppliers to ensure quality and viability.
- Growing Practices: Develop best practices for growing your chosen trees and shrubs. This may include fertilization, pest control, and irrigation strategies.

### 4. Legal Considerations and Sales Channels:

- Permits and Licenses: Research and obtain all necessary permits and licenses required for operating a nursery in your area. This might include business licenses, inspections, and plant sale permits.

### 5. Considerations for a Sustainable Agrivoltaic Nursery:

- Water Management: Implement water-saving practices throughout the nursery operation. Explore options like rainwater harvesting and drip irrigation.
- Waste Management: Develop a plan for responsibly managing plant waste generated during propagation and culling activities.

## Number of Trees and Shrubs:

- **Land Capacity:** Carefully consider the carrying capacity of your land. Ensure there's adequate space for planned plant numbers while adhering to proper spacing requirements.
- **Management Capabilities:** Be realistic about your experience level and ability to manage a large number of trees and shrubs. Start smaller if you're new to the nursery business.

## Propagation Techniques

### Vegetative Propagation

This method is used to reproduce plants that are genetically identical to the parent plant. This is particularly important for cultivating specific cultivars or desired traits that may not come true from seeds. Here are some common vegetative propagation techniques used in nurseries:

- **Cuttings:** This involves taking stem sections from a parent plant and encouraging them to root and develop into new plants. The type of cutting (softwood, hardwood, etc.) and timing will vary depending on the plant species.  
<https://m.youtube.com/watch?v=WHiv1OvXGcl>
- **Grafting:** This technique combines the rootstock (lower portion) of one plant with the scion (upper portion) of another plant to create a single plant with desired characteristics from both. <https://en.wikipedia.org/wiki/Grafting>
- **Layering:** This method involves encouraging roots to grow on a stem while it is still attached to the parent plant. The rooted stem can then be severed and become a new plant.  
<https://extension.okstate.edu/fact-sheets/layering-propagation-for-the-home-gardener.html>

### Seed Propagation

- **Seed collection:** Seeds need to be collected at the right time of maturity and stored properly to ensure viability.
- **Stratification:** Some seeds require a period of cold, moist storage to simulate winter conditions before they will germinate.
- **Sowing:** Seeds are sown in germination trays or beds with a suitable growing medium. Light, moisture, and temperature controls are important for successful germination.  
<https://www.youtube.com/watch?v=AarBDhXGV-k>

Here are some resources where you can learn more about propagation techniques for trees and shrubs:

- **Books:**
  - "Creative Propagation: A Grower's Guide" by Peter D. Ascher [1]
  - "Practical Woody Plant Propagation for Nursery Growers" by Malcolm C. Noland
- **Websites:**
  - University of Kentucky Cooperative Extension Service:  
<http://www2.ca.uky.edu/agc/pubs/ho/ho98/ho98.pdf>
  - The National Plant Network: <https://npn.mngr.net/>

## Chicken Farming

### 1. Research and Goal Setting:

- **Market Research:** Investigate the demand for eggs or meat chickens in your area. Identify potential customer segments (restaurants, grocery stores, direct-to-consumer) and research prevailing prices.
- **Financial Planning:** Develop a detailed business plan outlining your start-up costs, operational expenses, and projected revenue. This will help you secure funding and make informed decisions.

### 2. Choosing Your Flock and Preparing the Farm

- **Chicken Breed Selection:** Research different chicken breeds suitable for your market goals (egg production, meat production, dual-purpose). Consider factors like climate, disease resistance, and desired production volume.

### 3. Raising Healthy Chickens:

- **Chick Acquisition:** Decide whether to purchase day-old chicks or older pullets (young hens nearing egg-laying age). Source your chicks from reputable hatcheries that prioritize bird health.
- **Biosecurity Measures:** Implement a biosecurity plan to minimize the risk of introducing diseases to your flock. This may include quarantine procedures for new birds, footbaths, and regular coop disinfection.
- **Feed and Water Management:** Provide your chickens with a balanced diet formulated for their age and production stage. Ensure clean, fresh water is readily available throughout the day

### 4. Legal Considerations and Sales Channels:

- **Marketing and Sales Strategy:** Develop a marketing strategy to reach your target customers. Consider farmers markets, online platforms, or direct sales to restaurants and grocery stores.

### 5. Considerations for a Sustainable Agrivoltaic Chicken Farm:

- **Waste Management:** Develop a plan to manage chicken manure sustainably. This could involve composting it for fertilizer or exploring biogas generation technologies.
- **Water Conservation:** Implement water-saving practices in your operation, such as using drip irrigation and collecting rainwater.
- **Soil Health** Maintain healthy soil quality by using organic matter like composted manure and rotating grazing areas for free-range chickens.

### Things to Consider When Determining Flock Size:

- **Market Demand:** Start with a flock size that aligns with your identified market demand. You can always expand later.
- **Land and Coop Capacity:** Ensure your land and coop size can comfortably accommodate your chosen flock size without overcrowding.
- **Management Capabilities:** Consider your experience level and ability to manage a larger flock. Start smaller if you're new to chicken farming.

**Remember:** A successful agrivoltaic chicken farm requires careful planning, and ongoing management.

### **Boulder County animal units:**

#### [Animal Code in Boulder](#)

- Per Article 18-108, animal units establish an equivalent density for various species of livestock.
- Chickens - 50 chickens per unit - 4 units per acre = 200 chickens per acres

### **Morgan County Animal Units**

#### [Animal Code in Morgan County](#)

### **Additional Resources for Colorado Chicken Farmers**

In addition to the general steps outlined previously, here are some specific resources to help you succeed with your agrivoltaic chicken farm in Colorado:

#### **Colorado State University:**

- Colorado State University Extension: <https://extension.colostate.edu/> offers a wealth of resources for poultry producers, including:
  - Flock management practices
  - Biosecurity protocols
  - Marketing recommendations
  - Educational workshops and events

#### **Poultry Associations:**

- Colorado Poultry Association: <https://www.facebook.com/groups/223186221210645/> is a non-profit organization dedicated to promoting poultry production and education in Colorado.

#### **Books:**

- **The Backyard Flock: Our Complete Guide to Raising Chickens** by Jeannette Loomis (Loomis, Jeannette)

- **Pasture Poultry Profits: A Practical Guide to Raising Poultry on Pasture** by William G. Andrews (Andrews, William G.)
- **Building Your Own Chicken Coop** by Rob Ludlow (Ludlow, Rob)

## Sheep / Alpaca Ranching

### 1. Goal Setting and Market Research:

- **Define Your Vision:** Establish your long-term goals for the farm. Will you focus on wool production, meat production, breeding stock, or a combination?
- **Market Analysis:** Research the demand for sheep and alpaca products in your region. Identify potential customer segments (textile mills, meat processors, breeders, fiber artists) and analyze prevailing market prices.

### 2. Choosing Livestock and Preparing the Land:

- **Animal Selection:** Research sheep and alpaca breeds suitable for your climate zone and target market. Consider factors like fleece quality, meat production potential, herd size requirements, and temperament.

### 3. Animal Management and Husbandry:

- **Pasture Management:** Develop a grazing plan that promotes healthy pastures and optimal forage utilization. Consider incorporating rotational grazing techniques.
- **Shelter and Bedding:** Provide adequate shelter for your animals to protect them from harsh weather conditions. Use appropriate bedding materials for comfort and hygiene.
- **Veterinary Care:** Establish a relationship with a veterinarian specializing in sheep and alpacas for routine checkups and preventative healthcare.
- **Water infrastructure and considerations:** Water will not be accessible at the solar site provided. Water will be needed

### 4. Legal Considerations and Sales Channels:

- **Marketing and Sales Strategy:** Develop a comprehensive marketing strategy to reach your target customers. Consider online platforms, participation in farmers markets, or collaborating with local yarn stores and fiber mills.

### Number of Animals:

- **Market Demand:** Align your initial herd size with the identified market demand. You can always expand your herd as your business grows.
- **Management Capabilities:** Be realistic about your experience level and ability to manage a herd of sheep and alpacas. Start with a smaller herd size if you're new to livestock farming.

### Boulder County animal units:

[Animal Code in Boulder](#)

- Per Article 18-108, animal units establish an equivalent density for various species of livestock.
- Sheep/ Alpaca - 5 Sheep/ Alpaca per unit - 4 units per acre = 20 sheep/ Alpaca per acre

Remember: Building a successful agrivoltaic sheep and alpaca farm requires dedication, ongoing learning, and a commitment to sustainable practices.

### **Morgan County Animal Units**

[Animal Code in Morgan County](#)



## Beekeeping

### 1. Research and Preparation:

- **Learn the Basics:** Explore beekeeping through resources like books, online courses, or local beekeeping associations. Understand bee biology, hive management practices, and potential challenges.
- **Honeybee Selection:** Research different honeybee breeds suitable for your climate and goals (honey production, pollination services). Consider factors like disease resistance, temperament, and honey production volume.
  - Connect with local organizations such as Honeybee Herbals - <https://www.honeybeeherbals.co/>
- **Local Regulations:** Check County zoning regulations
- Boulder County
  - (<https://assets.bouldercounty.gov/wp-content/uploads/2017/03/p29-keeping-animals-in-boulder-county.pdf>) to understand beekeeping allowances in your area. Remember, the number of bee colonies is not limited in zones permitting Open Agricultural Uses.

### 2. Setting Up Your Apiary:

- **Choosing a Location:** Select a sunny, well-drained location with access to water and protected from strong winds. Consider the flight paths of your bees and potential conflicts with neighbors. This may look different in Solar Arrays. Be sure to try and understand how Solar Arrays affect bee productivity.
- **Hive Selection:** Decide on the type of hive you'll use (Langstroth hives are common). Ensure proper ventilation and space for honey production.
  - Colorado Honey Finder - <https://localhoneyfinder.org/CO.php>
  - Colorado Bee keepers - <https://coloradobeekeepers.org/think-you-want-to-keep-bees/where-to-get-bees/>
- **Acquiring Bees:** Source your bees from reputable beekeepers who prioritize healthy colonies. You can purchase established hives or starter packages with queen bees.

### 3. Beekeeping Practices:

- **Hive Inspections:** Regularly inspect your hives to monitor bee health, honey production, and potential problems like pests or disease.
- **Seasonal Management:** Adapt your management practices throughout the year. Provide additional food sources during winter and manage honey production during the summer months.
- **Sustainable Practices:** Utilize organic pest control methods whenever possible. Consider planting wildflowers near your apiary to provide a diverse food source for your bees.

#### 4. Honey Production and Processing:

- **Harvesting Honey:** Once your bees have produced sufficient honey, you can harvest honey frames using proper extraction techniques.
- **Processing and Storage:** Process your honey by extracting it from the frames and filtering it. Store honey in airtight containers in a cool, dry location.

#### 5. Additional Considerations:

- **Honeybee Diseases and Pests:** Learn about common honeybee diseases and pests, and how to implement preventative measures.
- **Beekeeping Associations:** Join a local beekeeping association to connect with experienced beekeepers, access resources, and participate in educational workshops.

#### Resources for Boulder County Beekeepers:

- **Boulder County Beekeepers Association:** <https://www.bouldercountybeekeepers.org/>
- **Colorado State University Extension:** <https://extension.colostate.edu/> offers resources on beekeeping practices, including:
  - Colony management
  - Disease prevention
  - Honeybee biology

#### Bee Code Units in Boulder County:

While Boulder County zoning regulations don't limit the number of bee colonies in zones permitting Open Agricultural Uses, it's important to practice responsible beekeeping and consider factors like:

- **Land Size:** Ensure your land has sufficient space to accommodate your desired number of hives without overcrowding bees or causing issues with neighbors.
- **Resource Availability:** Can your land provide enough nectar and pollen sources for your bees throughout the year?
- **Management Capabilities:** Consider your experience level and ability to manage a larger number of hives effectively.

## Berry production

### 1. Research and Planning:

- **Berry Selection:** Research different berry varieties that thrive in Colorado's climate and elevation. Popular choices include raspberries, strawberries, blueberries, and blackberries. Consider factors like ripening time, disease resistance, and desired yield.
  - What Varietals thrive at Jacks?
- **Site Selection:** Berry Patches thrive in Solar Arrays. Different berries have specific pH preferences, so test your soil and amend it if necessary
- **Market Research (For Farms):** If you plan to sell berries commercially, research local market demand for different varieties and potential sales channels (farmers markets, restaurants, direct-to-consumer).
- **Solar Sites and Water:** Sites will not have access to water. Water allocation needs to be considered in the business model for perennials.

### 2. Planting and Care:

- **Planting Techniques:** Learn proper planting methods for your chosen berry varieties. This includes spacing requirements, planting depth, and creating support structures for vining berries like raspberries.
- **Soil Management:** Maintain healthy soil by adding organic matter like compost and mulching around plants to retain moisture and suppress weeds.
- **Watering and Irrigation:** Provide consistent and adequate watering, especially during the first year of establishment. Implement drip irrigation for water conservation, if desired. Again water will be a limiting factor at almost if not all solar sites. Major considerations need to be taken into account.

### 3. Integrated Pest Management (IPM):

- **Organic Methods:** Prioritize organic pest control methods whenever possible. Use beneficial insects, row covers, or handpicking techniques to manage pests.
- **Disease Prevention:** Promote good air circulation within your berry patch and remove any diseased plant material to prevent the spread of diseases.
- **Monitoring:** Regularly monitor your plants for signs of pests or disease to take timely action.

### 4. Pollination and Fruit Production:

- **Pollinator Attraction:** Plant flowering herbs or companion flowers near your berries to attract bees and other pollinators.
- **Fruit Thinning (Optional):** For some berry varieties, thinning developing fruits can improve overall fruit size and quality.

## 5. Harvest and Storage:

- **Harvesting:** Harvest your berries when they are fully ripe and have reached their peak flavor and color. Timing varies depending on the berry variety.
- **Storage:** Store fresh berries in the refrigerator for a few days. For longer-term storage, consider freezing or drying your berries.

## Resources for Boulder County Berry Growers:

- **Colorado State University Extension:** <https://cmg.extension.colostate.edu/gardening-resources/online-garden-publications/sma-ll-fruits/> offers resources on various berry crops, including:
  - Planting guides
  - Pest management strategies
  - Harvesting and storage techniques
- **Boulder County Fruit Project:** <https://www.ollinfarms.com/> (research project on fruit varieties suitable for Boulder County)

## Additional Considerations:

- **Bird Control:** Implement bird netting or other deterrents to protect your ripening berries from hungry birds.
- **Winter Protection:** Depending on the berry variety, winter protection may be necessary in colder climates. Provide mulch or row covers to protect plants from harsh winter conditions.
- **Start Small and Scale Up:** Begin with a manageable number of plants and expand your berry patch as you gain experience and resources.

**Specialty herb and vegetable production** - Not advised due to water being limited at sites

### 1. Planning and Preparation:

- **Market Research:** Identify profitable specialty herbs and vegetables in your area. Consider factors like consumer demand, local restaurants' preferences, and potential sales channels (farmers markets, CSA programs).
- **Site Selection:** Choose a location with at least 6-8 hours of direct sunlight daily. Ensure well-drained soil with good fertility. Consider raised beds for optimal growing conditions.
- **Crop Selection:** Research suitable herbs and vegetables based on your climate, growing season length, and market demands. Popular options include:
  - **Herbs:** Basil, cilantro, lavender, rosemary, thyme, tarragon
  - **Vegetables:** Arugula, baby greens, cherry tomatoes, culinary peppers, microgreens
  - **Solar Sites and Water:** Sites will not have access to water. Water allocation needs to be considered in the business model for perennials. If major considerations are needed, fall rotational grazing / cover crops may be necessary to support annual / herb production.
- **Soil testing:** Soil testing is necessary to determine fertilizer application, amendment application and other considerations for a successful season of production.

### 2. Planting and Care:

- **Seed Starting or Transplanting:** Decide whether to start your herbs and vegetables from seeds or purchase transplants from nurseries. Consider factors like germination time and desired harvest window. Will need to consider a greenhouse for viability.
- **Soil Preparation:** Amend your soil with organic matter like compost or aged manure to improve drainage, fertility, and water retention.
- **Planting Techniques:** Follow proper planting depths and spacing requirements for your chosen crops. Group plants with similar water and sunlight needs.

### 3. Integrated Pest Management (IPM):

- **Organic Methods:** Prioritize organic pest control whenever possible. Use beneficial insects (ladybugs for aphids), row covers to deter pests, and handpicking techniques to manage pest populations. First year herbicide applications may be necessary depending on the degradation of the land.
- **Disease Prevention:** Practice good garden hygiene, removing diseased plant material and promoting air circulation to prevent fungal diseases.
- **Monitoring:** Regularly inspect your plants for signs of pests or diseases to take timely action and minimize damage.

### 4. Irrigation and Weed Control:

- **Watering:** Provide consistent and adequate watering, especially during hot and dry periods. Utilize drip irrigation for water conservation and to minimize evaporation.

- **Weed Control:** Implement weed control strategies like mulching around plants, hand weeding, or using organic herbicides to minimize competition for nutrients and water.

#### **5. Harvest and Post-Harvest Handling:**

- **Harvesting:** Harvest your herbs and vegetables at their peak flavor and maturity. Timing varies depending on the specific crop.
- **Post-Harvest Handling:** Handle your produce carefully to minimize damage. Cool quickly after harvest and store in the refrigerator or a cool, dark location to maintain freshness and quality.

#### **6. Additional Considerations:**

- **Companion Planting:** Research companion planting strategies to attract beneficial insects and deter pests naturally.
- **Succession Planting:** Practice succession planting throughout the season to maximize your harvest window and land use.

## Pig Rearing

### 1. Initial Planning:

- **Market Research:** Investigate the demand for pork products (meat, breeding stock) in your area. Identify potential customer segments (restaurants, direct-to-consumer) and research prevailing prices.
- **Financial Planning:** Develop a business plan outlining your start-up costs (price of piglets, water trough, water tanks, pickup truck, trailer), operational expenses (water trucking, feed, veterinary bills), and projected revenue (ex. carcasses, meat, manure, chitlin). This will help you secure funding and make informed decisions.

### 2. Choosing Your Pigs and Preparing the Farm:

- **Breed Selection:** Research different pig breeds suitable for your market goals (meat production, breeding stock). Consider factors like climate, growth rate, and desired meat characteristics.
  - Links for this
- **Sourcing Pigs:** Decide whether to purchase piglets, weaners (young pigs recently weaned from their mothers), or breeding stock from reputable breeders.
  - Links for this
- **Farm Design:** Design a piggery that provides adequate space, shelter, and waste management facilities. Consider factors like age, group size, and ventilation needs.

### 3. Raising Healthy Pigs:

- **Biosecurity Measures:** Implement a biosecurity plan to minimize the risk of introducing diseases to your herd. This may include quarantine procedures for new animals, footbaths, and regular cleaning and disinfection of pens.
- **Feeding and Nutrition:** Provide your pigs with a balanced diet formulated for their age and production stage.
- **Animal Welfare:** Ensure your pigs have adequate space, proper bedding, and enrichment activities to promote good physical and mental health. Consider humane handling practices during all stages of care.

### 4. Legal Considerations and Sales Channels:

- **Licensing and Permits:** Research and obtain any necessary licenses and permits required for pig farming in your area.
- **Animal Welfare Regulations:** Familiarize yourself with animal welfare regulations and ensure your practices comply with all standards.
- **Marketing and Sales:** Develop a marketing strategy to reach your target customers. Consider farmers markets, online platforms, or direct sales to restaurants and grocery stores.

## Additional Resources:

- **National Pork Producers Council:** <https://pork.org/> provides resources on pig production practices, marketing, and regulations.
- **Your Local Cooperative Extension Office:** Offers educational programs and technical assistance for pig farmers in your area.
- **Books:**
  - **The Pig: A Comprehensive Guide to Breeding, Care, and Management** by Jennie S. Vandervelde (Vandervelde, Jennie S.)
  - **Pasture Pigs: Raising Pigs for Profit on Pasture** by Pamela S. Barnes (Barnes, Pamela S.)

## Boulder County animal units:

### [Animal Code in Boulder](#)

- Per Article 18-108, animal units establish an equivalent density for various species of livestock.
- Pigs - 5 Sheep/ Alpaca per unit - 4 units per acre = 20 sheep/ Alpaca per acre

## Morgan County Animal Units

### [Animal Code in Morgan County](#)

### **Factsheets on animal units per acre**

Vietnam / cantonese/ mandarin / spanish

Find restaurants - in ft morgan

1. Local ethnic restaurants
2. CDA - how would people report selling products to their community (certain things they don't have to pay taxes on)
- 3.

## Markets / Outlets for Revenue

- Finding outlets for markets will be the best opportunity for product selling
- NGO Markets
  - Local agroforestry non-profit organizations
    - Drylands Agroecology Research
    - Online business Marketing
    - Local county governments



## Farmers Markets

- **Adams County**
  - Anythink Huron Street
    - 9417 Huron St., Thornton, CO 80260
    - Tuesdays, June 20-Sept. 26, 2023
    - 9 am-12 pm
  - Anythink Wright Farms
    - 5877 E. 120th Ave., Thornton, CO 80602
    - Thursdays, June 22-Sept. 28, 2023
    - 9 am-12 pm
- **Boulder County**
  - Boulder County Farmers Market
    - 13th Street, Boulder, CO
    - Saturday Market: April 6 – November 23, 2024
    - 8 am – 2 pm
    - Wednesday Market: May 1 - October 2, 2024
    - 3:30 pm – 7:30 pm
  - Longmont Farmers Market
    - Boulder County Fairgrounds 9595 Nelson Road, Longmont, CO
    - Saturday Market: April 6 – November 23, 2024
    - 8 am – 1 pm
- **Morgan County**
  - BRUSH FARMERS MARKET
  - FARMERS & ARTISANS COMMUNITY MARKET
  - BRIGHTON DOWNTOWN SATURDAY MARKET
  - GARDEN OF EATON FARMERS MARKET
  - MILE HIGH FLEA MARKET
  - PARKERFEST FARMERS MARKET
  - JOHNSTOWN MILLIKEN FARMER'S MARKET
  - FREDERICK MARKET
- **Weld County**
  - City of Erie
    - May 9 - September 26 Thursdays from 5 to 8 p.m.
    - Briggs St. between Wells and Moffatt
  - GREELEY FARMERS MARKET & AT THE DEPOT
  - Town of Windsor
    - June 1 to August 31: Saturdays from 8 a.m. to 12:30 p.m.
    - Boardwalk Park, 100 N. 5th St.

## Educational Support

1. Supplied spanish webinars for each subject
2. Lien item outline of items for each farming opportunity
3. Risks associated and how to prepare and be resilient for them

## Agrivoltaics Webinars

Contact support for each of these

1. List of community contacts

- a. Spanish speaking friends / people in the area that could help