



Centrum spolupráce s inklúziou Harmónia - Inclusion Cooperation Center Harmónia

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Workshop on Hemp Cultivation and Its Use in Ecological Construction

Goal of the Workshop: Participants will learn about the advantages of hemp, techniques for its cultivation, and possibilities for its use as a natural building material. The workshop will include theoretical knowledge and practical demonstrations.

Advantages and Techniques of Hemp Cultivation

Introduction: An introduction to the history and current use of hemp (*Cannabis sativa*) as a useful herb and industrial material.

History of Hemp

- **Ancient China:**
 - **Use:** Hemp was cultivated for fibers to make ropes, textiles, and paper. Seeds were used as food and in traditional medicine.
 - **Textiles:** The first mentions of hemp fiber date back to around 2700 BC in China.
- **Ancient Egypt:**
 - **Use:** Hemp fiber was used to make ropes and canvases essential for shipbuilding and goods transportation on the Nile.
 - **Medicinal Properties:** Egyptian medical texts mention the use of hemp to treat various health problems.
- **Ancient India:**
 - **Use:** Hemp was part of Ayurvedic medicine. Bhang, a drink made from hemp, was used during religious ceremonies and festivals.
 - **Textiles:** Hemp was also used for making fabrics and ropes.
- **Europe:**
 - **Middle Ages:** Hemp was a key crop in Europe, used for making sails and ropes for ships. For example, in the 16th century, England ordered farmers to grow hemp to ensure enough material for its navy.

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Current Use of Hemp

- **Industrial Use:**
 - **Building Materials:** Hempcrete is a mixture of hemp hurds, lime, and water. This material is lightweight, insulating, and has excellent ecological properties.
 - **Textiles and Fashion:** Hemp fiber is used to produce eco-friendly textiles that are durable and long-lasting. Many modern clothing brands are beginning to use hemp as a sustainable alternative to cotton.
- **Food Industry:**
 - **Seeds and Oil:** Hemp seeds are rich in proteins, essential fatty acids, and other nutrients. Hemp oil is valuable for its health benefits and is used in food and cosmetics.
- **Medicinal Use:**
 - **CBD Products:** Cannabidiol (CBD) extracted from hemp is popular for its medicinal properties, including pain relief, anxiety reduction, and anti-inflammatory effects. CBD oils, capsules, and other products are widely available and used in modern medicine.
- **Ecological Benefits:**
 - **Soil Regeneration:** Hemp can clean contaminated soil and improve its quality. Its roots can reach deep into the soil, helping to prevent erosion and improve soil structure.

Further Educational Material:

- The Hemp Farming Guide
- Hemp Grower Magazine
- International Hemp Building Association
- Hempcrete Direct

Advantages of Hemp: Hemp (*Cannabis sativa*) is a versatile and environmentally friendly plant with many benefits. Below are the main ecological properties, usage possibilities, and positive effects on soil.

Ecological Properties:

- **Low Pesticide and Herbicide Requirements:**
 - Hemp is naturally resistant to most pests, meaning that large amounts of chemical pesticides and herbicides are not needed.
 - Its dense leaf structure effectively suppresses weed growth, further reducing the need for herbicides.
- **Rapid Growth:**

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- Hemp grows very quickly, typically reaching full height (up to 4 meters) in just 3 to 4 months.
- This growth rate allows for multiple harvests per year, increasing its productivity and efficiency compared to other crops.
- **High Biomass Yield:**
 - Hemp produces a large amount of biomass, which can be used for various industrial applications such as textiles, paper, building materials, and biofuels.
 - The high yield also contributes to its economic advantage as a renewable resource.

Usage of Hemp:

- **In Medicine:**
 - Hemp contains cannabinoids such as CBD (cannabidiol) and THC (tetrahydrocannabinol) with various medicinal effects.
 - CBD is known for its anti-inflammatory, analgesic, and anxiolytic properties, while THC is used for its psychoactive effects and pain treatment.
- **In Food:**
 - Hemp seeds are rich in proteins, essential fatty acids (omega-3 and omega-6), and other nutrients, making them ideal for producing healthy foods and oils.
 - Hemp oil is used in both culinary and cosmetic products due to its moisturizing and nourishing properties.
- **In Construction:**
 - Hempcrete is a mixture of hemp hurds, lime, and water. This material is lightweight, insulating, and has excellent ecological properties.
 - Hemp insulation is efficient, durable, and sustainable, making it ideal for low-energy and passive houses.

Positive Effects on Soil:

- **Deep Roots:**
 - Hemp has deep roots that can penetrate up to 2 meters deep. These roots help improve soil structure and its ability to retain water.
 - Hemp also helps reduce soil erosion and can be used for phytoremediation, a process where plants remove toxins from the soil.

Further Educational Material:

- The Hemp Farming Guide
- Hemp Grower Magazine

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- International Hemp Building Association
- Hempcrete Direct

Selection of Variety:

- **Industrial Hemp vs. Medical Hemp:**
 - **Industrial Hemp:** Grown primarily for its fiber and seeds. It has a low THC content (less than 0.3%), meaning it does not have psychoactive effects. It is used in industries for producing textiles, paper, building materials, biofuels, and other products.
 - **Medical Hemp:** Has higher cannabinoid content, such as THC and CBD, and is grown for its medicinal effects. It is used in medicine to treat various conditions such as pain, inflammation, anxiety, and other health issues.
- **Varieties Suitable for Different Climatic Conditions:**
 - **Colder Climate:** Varieties like Finola or Fedora, which have a shorter growing season and are cold-resistant.
 - **Warmer Climate:** Varieties like Carmagnola or Kompolti, which better tolerate higher temperatures and have a longer growing season.

Reference for Further Reading: Hemp Varieties

Soil Preparation:

- **pH and Nutrient Requirements:**
 - **Soil pH:** The optimal pH for hemp cultivation is between 6.0 and 7.5. The soil should be well-drained and rich in organic matter.
 - **Nutrients:** Hemp requires sufficient nitrogen, phosphorus, and potassium. Regular soil testing can help determine what nutrients need to be supplemented.
- **Composting and Organic Fertilizers:**
 - **Compost:** Using compost improves soil structure, increases nutrient content, and promotes microbial activity. Compost can be made from plant residues, leaves, grass, and other organic materials.
 - **Organic Fertilizers:** Fertilizers such as manure, bone meal, or fish emulsion can be used to enrich the soil with necessary nutrients.

Examples:

- **Green Manure:** Growing cover crops like clover or alfalfa can help improve nitrogen content in the soil and reduce erosion.
- **Crop Rotation:** Alternating hemp with other crops like legumes or cereals can help maintain soil health and reduce the incidence of pests and diseases.

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Planting and Care:

- **Direct Sowing vs. Seedlings:**
 - **Direct Sowing:** Hemp seeds can be sown directly into the soil in spring when the soil temperature reaches at least 10°C. Direct sowing is suitable for large-scale cultivation.
 - **Seedlings:** Seedlings can be pre-grown in a controlled environment and then transplanted to the field, allowing for a longer growing season and potentially increasing yield.
- **Irrigation, Weeding, and Pest Protection:**
 - **Irrigation:** Hemp requires regular watering, especially during dry periods. Drip irrigation is an effective method that minimizes evaporation and conserves water.
 - **Weeding:** Regular weeding is important, especially in the early growth stages, to prevent competition for nutrients and water. Mulching can also help suppress weeds.
 - **Pest Protection:** Using biological insecticides and natural predators can help keep pests under control without using chemical pesticides.

Techniques to Increase Yield:

- **Growth Support:** Using support structures like nets or stakes can help plants grow upright and improve their exposure to sunlight.
- **Pruning:** Regular pruning can promote branching and increase the yield of flowers and seeds. It is important to remove damaged or diseased parts of the plant.

References for Further Educational Material:

- The Hemp Farming Guide
- Hemp Grower Magazine
- Rodale Institute - Industrial Hemp

Hemp as One of the First Domesticated Plants

- **Hemp (*Cannabis sativa*) is considered one of the first plants domesticated by humans. Archaeological evidence suggests that hemp was cultivated more than 10,000 years ago in what is now China and Taiwan. Ancient civilizations used hemp for its fiber, seeds, and medicinal properties. It was used to make ropes, textiles, and paper, as well as in traditional medicine.**

Hemp as a Key Crop for Making Ropes and Canvases

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- **In the past, hemp was a crucial crop for making ropes and canvases. For example, in medieval Europe, the production of hemp ropes and canvases was essential for the maritime industry. In the 16th century, England issued regulations requiring farmers to grow hemp to ensure enough material for making sails and ropes for the English navy.**

Other Interesting Facts:

- **Historical Use:** Hemp was used in ancient Egypt for making textiles and in traditional medicine. In India, hemp was part of Ayurvedic medicine and was used during religious ceremonies.
- **Ecological Benefits:** Hemp can improve soil structure due to its deep roots and can be used for phytoremediation, a process where plants remove toxins from the soil.
- **Modern Use:** Today, hemp is increasingly used in various industrial sectors, including construction, food, and medicine.

References for Further Educational Material:

- The Hemp Farming Guide
- Hemp Grower Magazine

Practical Planting of Hemp

Introduction: A practical demonstration of planting hemp in an outdoor field or greenhouse.

Work Procedures:

Preparation of Beds:

- **Deep Soil Processing:**
 - **Deep Processing:** The soil should be processed to a depth of at least 30 cm to be well-aerated and ready for the hemp root system. This processing helps remove weeds and prepare the soil for the addition of organic material.
 - **Weed Removal:** Before planting, it is important to remove all weeds that could compete with hemp for nutrients and water. Mechanical weeding or using mulch can be effective methods.
- **Adding Compost or Organic Fertilizer:**
 - **Composting:** Adding compost increases the organic matter content in the soil, improves its structure, and increases its water-holding capacity. Compost also supplies essential nutrients that support plant growth.

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- **Organic Fertilizers:** Using organic fertilizers such as manure, bone meal, or fish emulsion helps ensure sufficient nitrogen, phosphorus, and potassium, which are key nutrients for healthy hemp growth.

Planting Seeds/Seedlings:

- **Depth and Spacing Between Plants:**
 - **Planting Depth:** Hemp seeds are sown to a depth of 1-2 cm. If using seedlings, it is important to transplant them at the same depth they were growing in the nursery.
 - **Spacing:** Optimal spacing between plants depends on the variety and intended use. For industrial hemp grown for fiber, the recommended spacing is 15-30 cm between plants. For hemp grown for seeds, the spacing can be larger, around 60-100 cm.
- **Example of Proper Watering After Planting:**
 - **First Watering:** After planting, it is crucial to water thoroughly to ensure the seeds and seedlings root well. Drip irrigation is recommended to provide uniform and efficient watering without overwatering.

Care for Plants:

- **Monitoring Growth and Health of Plants:**
 - **Regular Inspection:** Plants should be regularly inspected for signs of stress, diseases, or pest infestations. Monitor growth stages and ensure sufficient supply of nutrients and water.
 - **Record Keeping:** Keeping records of plant growth, watering, and fertilizer application can help optimize care and increase yields.
- **Methods of Pest Control Without Chemicals:**
 - **Biological Control:** Using natural predators such as ladybugs or parasitic wasps can help control pest populations without using chemical pesticides.
 - **Organic Sprays:** Using organic sprays such as neem oil or garlic extract can help protect plants from pests and diseases.

Examples: Practical Demonstrations of Different Planting Methods (Direct Sowing vs. Seedlings):

- **Direct Sowing:**
 - **Procedure:**
 - **Soil Preparation:** Before sowing, it is important to process the soil deeply and remove weeds. Enrich the soil with compost or organic fertilizer.

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- **Sowing Seeds:** Sow hemp seeds to a depth of 1-2 cm in rows spaced 15-30 cm apart for industrial hemp or 60-100 cm apart for hemp grown for seeds.
- **Watering:** Immediately after sowing, water the soil thoroughly to ensure the seeds have enough moisture for germination.
- **Seedlings:**
 - **Procedure:**
 - **Pre-Growing Seedlings:** Sow hemp seeds into small containers with quality substrate and grow them in a greenhouse or indoors with sufficient light.
 - **Transplanting:** Once the seedlings reach a height of 10-15 cm and have several true leaves, they can be transplanted to the field or greenhouse. Transplant the seedlings at the depth they were growing in the nursery, spaced 60-100 cm apart.
 - **Watering:** After transplanting, water thoroughly to ensure the seedlings root well.
- **Example Video:**
 - Direct Seeding vs. Transplanting Hemp

Example: Composting and Soil Preparation

- **Composting:**
 - **Procedure:**
 - **Collecting Material:** Collect organic material such as kitchen scraps, leaves, grass, and small branches. Avoid meat, dairy products, and diseased plants.
 - **Layered Compost:** Alternately layer green material (rich in nitrogen, e.g., kitchen scraps) and brown material (rich in carbon, e.g., leaves and branches). Keep the compost moist and turn it regularly to speed up decomposition.
 - **Composting:** Let the compost mature for several months to a year until it turns into dark, crumbly material without odor.
- **Soil Preparation:**
 - **Procedure:**
 - **Deep Processing:** Process the soil to a depth of at least 30 cm to aerate it and prepare for planting.
 - **Adding Compost:** Spread a layer of compost or organic fertilizer on the soil surface and work it into the soil to improve its structure and nutrient value.
 - **Weed Removal:** Remove all weeds that could compete with hemp for nutrients and water.

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- **Example Video:**
 - How to Compost and Prepare Soil for Planting

Interesting Facts About Hemp

- **Hemp Can Grow Up to 4 Meters High in One Season:**
 - **Hemp (*Cannabis sativa*) is known for its rapid growth and can reach a height of up to 4 meters in a single growing season. This characteristic makes hemp an ideal crop for biomass production and various industrial products.**
 - **Ecological Benefits:** The rapid growth of hemp helps quickly restore green areas and improve air quality through photosynthesis, contributing to environmental protection.
 - **Industrial Use:** Tall hemp plants are suitable for fiber production, used in the textile industry, construction (hempcrete), and bioplastics.

Hemp Plants Have Deep Roots That Help Prevent Soil Erosion:

- **Hemp has a deep root system that can penetrate up to 2 meters deep. These deep roots not only ensure plant stability but also contribute to soil protection and improvement.**
- **Erosion Prevention:** Deep hemp roots help stabilize the soil and reduce the risk of erosion, which is especially important in areas with high rainfall or strong winds.
- **Soil Structure Improvement:** Hemp roots improve soil structure by creating pores and pathways for water and air, promoting healthy growth of other crops.
- **Phytoremediation:** Hemp can be used for phytoremediation, a process where plants help remove contaminants from the soil. Hemp can absorb heavy metals and other toxins, contributing to the cleaning and restoration of polluted soils.

References for Further Educational Material:

- Hemp Farming Academy
- Rodale Institute - Industrial Hemp

14:30 - 16:00 - Use of Hemp in Ecological Construction

- **Hemp (*Cannabis sativa*) is becoming increasingly popular as a material in ecological construction due to its sustainable properties and environmental benefits. Below are the main hemp-based building materials and their uses.**
- **Hempcrete:**
 - **Composition and Production:**

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- **Components:** Hempcrete is a mixture of hemp hurds (woody parts of the stalk), lime, and water. Hurds provide a lightweight, insulating structure, while lime acts as a binder.
- **Production:** The mixture is made on-site or in a factory and then applied into formwork where it hardens. The process is similar to traditional concrete, but the resulting material is much lighter and more insulating.
- **Properties and Advantages:**
 - **Thermal Insulation:** Hempcrete has excellent insulating properties, helping to maintain stable indoor temperatures, reducing the need for heating and cooling.
 - **Moisture Permeability:** This material is vapor-permeable, meaning it can regulate moisture inside the building and prevent mold formation.
 - **Durability and Strength:** Hempcrete is resistant to rot, pests, and fire. While not as strong as traditional concrete, its strength is sufficient for non-load-bearing walls and insulation.
- **Hemp Insulation:**
 - **Types and Production:**
 - **Insulation Mats:** Made from processed hemp fibers, formed into mats or rolls. These mats are used as insulation material in walls, roofs, and floors.
 - **Spray Insulation:** Hemp fibers can also be used in spray insulation, applied similarly to foam insulation but without harmful chemicals.
 - **Properties and Advantages:**
 - **Thermal and Sound Insulation:** Hemp insulation provides excellent thermal and sound insulation, improving energy efficiency and comfort in buildings.
 - **Ecological Sustainability:** Hemp insulation is biodegradable, free of harmful chemicals, and has a low carbon footprint.
 - **Health Benefits:** Unlike traditional insulations, hemp insulation does not contain harmful substances that could cause allergies or respiratory problems.

Other Ecological Building Materials from Hemp:

- **Hemp Bricks:** Made from a mixture of hemp hurds and lime, hemp bricks are lightweight and have good insulating properties. They are suitable for constructing non-load-bearing walls and partitions.
- **Hemp Boards:** Pressed boards made from hemp fibers can be used as building panels that are lightweight, strong, and moisture-resistant.

Advantages of Hemp Building Materials:

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- High insulating capacity, moisture regulation, durability, and ecological sustainability.
- Easy recyclability and biodegradability.

Techniques and Procedures:

- **Production of Hempcrete:**

- **Mixture of Hemp Hurds, Lime, and Water:**

- **Composition:** Hempcrete consists of hemp hurds (woody part of the stalk), lime (usually hydraulic lime or lime hydrate), and water.

- **Procedure:**

- **Mix Preparation:** Mix hemp hurds with lime in a 1:1 ratio by volume. Add water and mix until the mixture reaches the consistency of wet sawdust mulch. The mixture should be moist enough to hold its shape but not too wet.

- **Testing:** Before applying, it is recommended to create a small test block to verify the correct consistency and hardening of the mixture.

- **Application for Wall Construction and Insulation:**

- **Formwork:** Set up formwork (wooden or metal molds) around the area where the hempcrete will be applied. The formwork should be securely attached to prevent leakage of the mixture.

- **Filling and Compacting:** Fill the formwork with the hempcrete mixture and compact it gradually to remove air pockets and ensure good adhesion. Work layer by layer, compacting each layer before adding more mixture until the formwork is fully filled.

- **Curing:** After filling, let the mixture cure. The curing time depends on the humidity and temperature of the environment but usually takes several days to weeks.

- **Use of Hemp Insulating Materials:**

- **Production and Installation of Hemp Insulation:**

- **Production:** Hemp fibers are processed and pressed into insulating mats or rolls. These insulating materials can be made in various thicknesses and densities to meet specific insulation requirements.

- **Installation:** Hemp insulation is installed similarly to other insulation materials. It can be placed between wall frames, floor joists, or on the roof. Installation is simple and does not require special protective equipment because hemp insulation does not contain harmful substances.

- **Examples of Use in Low-Energy and Passive Houses:**

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- **Low-Energy Houses:** Hemp insulation provides excellent thermal and sound insulation, ideal for low-energy buildings that require minimal energy consumption for heating and cooling.
- **Passive Houses:** Due to its insulating properties and ability to regulate moisture, hemp insulation is suitable for passive houses that rely on natural ventilation and minimal use of mechanical systems to maintain comfortable temperatures.

Practical Demonstrations:

1. Demonstration of Building a Small Structure with Hempcrete:

- **Procedure:** In a practical demonstration, build a small structure such as a shed or model wall using hempcrete. Show how to prepare the mixture, fill the formwork, and compact the mixture. Allow participants to try these steps themselves to gain practical experience.

2. Demonstration of Roof and Wall Insulation:

- **Procedure:** Show how to properly install hemp insulation on walls and roofs. Emphasize important steps such as correctly placing the insulation between framing, securing it against movement, and covering it with a vapor barrier (if needed). Let participants install a part of the insulation themselves to gain practical experience.

Examples of Hempcrete Buildings Worldwide:

● Projects of Hempcrete Buildings:

- **Maison en Paille et Chanvre, France:**
 - **Location:** Montargis, France
 - **Description:** This ecological building uses hempcrete for wall construction, providing excellent thermal insulation and vapor permeability. The building is designed to minimize energy requirements for heating and cooling.
 - **Interesting Fact:** The house was built as part of an ecological project supported by the French government to promote sustainable building materials.
- **Endeavour Centre, Canada:**
 - **Location:** Ontario, Canada
 - **Description:** Endeavour Centre is an educational institution focused on sustainable construction. One of their main projects is a hempcrete building that serves as a practical example for students and visitors.
 - **Interesting Fact:** The building uses hempcrete for walls and floors, demonstrating its insulating capabilities and ecological sustainability.
- **Hemp House, USA:**

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- **Location:** Asheville, North Carolina, USA
- **Description:** This house is one of the first in the USA built with hempcrete. The building is designed to be energy-efficient and environmentally friendly.
- **Interesting Fact:** The house uses solar panels and a rainwater collection system, enhancing its sustainability.

Modern Architecture Using Hemp as a Primary Building Material:

- **Maison Chanvre, France:**
 - **Location:** Mimizan, France
 - **Description:** This modern house was built using hempcrete and other natural materials. The design of the house combines traditional techniques with modern architecture, creating aesthetically pleasing and energy-efficient housing.
 - **Interesting Fact:** The house has won several awards for sustainability and innovative use of natural materials.
- **The Hemperor, Netherlands:**
 - **Location:** Groningen, Netherlands
 - **Description:** This office and commercial complex uses hempcrete for its walls and facades. The building is designed with an emphasis on low energy consumption and high indoor environmental quality.
 - **Interesting Fact:** The complex is equipped with a green roof and rainwater recovery systems, contributing to its ecological sustainability.
- **Hemp Eco Systems, Switzerland:**
 - **Location:** Rapperswil, Switzerland
 - **Description:** This building uses hempcrete to improve energy efficiency and occupant comfort. The project is part of a broader effort to integrate ecological building materials into mainstream practice.
 - **Interesting Fact:** The building is designed to minimize its carbon footprint and maximize the use of renewable energy sources.

Interesting Facts About Hempcrete and Its Ecological Benefits:

- **Hempcrete is Lightweight but Strong and Has Excellent Insulating Properties:**
 - **Hempcrete (hempcrete) is a unique building material made from hemp hurds, lime, and water. This material has several exceptional properties:**
 - **Lightweight:** Hempcrete is much lighter than traditional concrete, making it easier to handle and reducing the load on the building structure.

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- **Strength:** While not as strong as traditional concrete, it provides sufficient strength for non-load-bearing walls and insulation applications. Its strength is adequate for many construction needs, especially in combination with wooden or steel frames.
- **Insulating Properties:** Hempcrete has excellent thermal and sound insulating properties. Its ability to regulate moisture and maintain stable indoor temperatures contributes to energy efficiency and occupant comfort.
- **Vapor Permeability:** This material allows walls to "breathe," meaning it regulates moisture inside the building and helps prevent mold and rot formation.

Growing Hemp for Building Purposes Can Contribute to Sustainable Agriculture:

- **Hemp is not only useful as a building material, but its cultivation also has several significant ecological benefits for agriculture:**
 - **Soil Restoration:** Growing hemp can improve soil structure and fertility. Deep hemp roots help aerate the soil, improve its structure, and support the healthy growth of other crops.
 - **Low Pesticide and Herbicide Requirements:** Hemp is naturally resistant to most pests, reducing the need for chemical pesticides and herbicides. This minimizes the negative impact on the environment and human health.
 - **Rapid Growth and High Yield:** Hemp grows very quickly and can be harvested multiple times a year, increasing agricultural efficiency. It also produces a large amount of biomass that can be used in various industrial sectors.
 - **Phytoremediation:** Hemp can absorb toxins from the soil, which can help clean contaminated soils and improve their quality.

References for Further Educational Material:

- Hempcrete Direct
- International Hemp Building Association

Discussion on Hemp Cultivation and Use

Open Discussion:

- **Goal:** Allow workshop participants to share their thoughts, questions, and experiences with hemp cultivation and use.
- **Format:** Moderated discussion where participants can ask questions, answer them, and discuss various aspects of hemp cultivation and use.

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Answering Participants' Questions:

- **Frequent Questions:**

- What are the best hemp varieties for different climatic conditions?
- What are the main challenges in growing hemp

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