

MUSHROOM CULTIVATION, - PROCESS.

Classification:

Mushroom are fungi and can be classified into three basic ecological groups, *Mycorrhizal*, *parasitic* and *Saprophytic*.

Training:

Training is conducted at J.K.U.A.T. Juja Campus once or month. Farmers who form groups can also trained on site

Spawn

High quality spawn of the mushroom discussed, here and others are available at JKUAT-Juja Campus

Types of mushroom:

There are many types of mushroom that can be cultivated in Kenya but we have started with *Agaricus Bisporus (Buttons)*, *Pleurotus (Oyster)*, *Lentinus (Shiitake)* and *Ganoderma*. This range is continuously being expanded as demand grows.

Requirements (Substrate):

Mushrooms are grown utilizing agricultural wastes, e.g. cereal straws, maize stocks, bean stock, Cotton husks, maize cobs, coffee husks, coffee pulp, paper waste, papyrus, water hyacinth, banana fronds etc.

Structures:

Mushrooms can be grown in unused buildings among them Go-downs, Garages, chicken houses, unused factories, etc. Mud thatched houses also create the right climate. Bricks and stone can also be used. Custom built structures with air conditioning can be constructed but they are expensive and beyond the ability of many farmers.

Training on mushrooms at the University is geared towards growing mushroom utilizing cheap materials, and cheap structure using local materials which lower cost of start up

Markets:

Mushrooms can be sold in supermarkets, hotels and green grocers in their fresh form. They can be preserved by drying in the sun and sold as that, considering mushrooms are very perishable.

A few outlets in Nairobi are: Zucchini (ABC Place and the Junction). Corner Shop – Yaya Centre and Diamond Plaza Parklands, Westlands Green Grocers, Uchumi Supermarkets, City Market, City Park Hawkers Market, Muthaiga Mini Market, Village Market, Field Fresh, Gigiri, Nakumatt and Tuskeys, Supermarkets, Avocado- Sarit centre.

Utilization:

Mushrooms are quite versatile and go well with a majority of dishes. They have a delicate velvety texture and can be eaten raw in salads, highly sautéed or cooked well to release a trace of sea food flavor. They generally take up to 10 minutes to cook. Overcooking should be avoided to avoid lose of flavor.

Nutritional Value of mushroom:

Different mushrooms have different Nutrition values but generally they are rich in protein, fibre, and vitamins and very low in cholesterol and fats and are therefore referred as health food.

Agaricus (Buttons):

This is the most common mushroom in the Kenyan Market. Their colour varies from white to brown as does the size, from small to extremely large. They are plump and dome shaped. Their flavor is enhanced through cooking.

The growing of this mushroom require the preparation of compost made from cereal straws, supplemented with horse manure, chicken manure, and even cow manure. The material is stacked turned and watered to elevate the temps which encourage proliferation of thermo tolerant microorganisms which convert cellulose compounds into cellular proteins.

The compost is then pasteurized with elevated temps to neutralize pests by selectively favoring thermo tolerant fungi and actinomyces.

Nutrition of Agaricus Buttons :

Moisture	:	88-90%
Crude Protein	:	N x 4.48
Fat	:	1.7 – 3.1
Carbohydrates	:	51.3 – 62.5
Fibre	:	8.0 – 10.4
N-Free Carbohydrates:		U4.0 – 53.5
Energy (Kcal/100g dry Material)		

Medicinal Value:

- Improves Immune System
- Alleviates Allergies
- Improves Kidney and Liver function
- Rich in fibre – mops disease causing toxins from the digestive system

Pleorotus -Oyster:

This mushroom has convex cap expanding to broadly convex eventually flat and even upturned in age, 5 – 20cm in diameter. The colour is white to yellow or grey. The colour

varies according to strain, lighting and temperature condition. Some strains grow in clusters while other form individuals.

This mushroom is gaining popularity in Kenya because of the ease of growing utilizing a big variety of Agricultural wastes. When cooked, it has an intense flavour. (Pasteurization is done with steam or boiling water).

Nutritional Value:

Crude protein	-	10 – 30%
Vitamin C	-	30 – 144mg/100g
Folic Acid	-	65mg/100g
Potassium	-	306mg / 100g

Medicinal value:

Active ingredients “*LOVASTATIN*”

- Lowers blood pressure
- Improves kidney and liver function
- Cures gastrointestinal disorders
- Lowers blood cholesterol
- Relives pain in gout – 100g/day in take

Lentnus -Shiitake:

The cap of shiitake is broad, hemispheric expanding to convex and eventually plane at maturation.

The colour is black brown at first becoming light brown in age.

Growing shiitake utilizes saw dust, chips, rice straw, bran buffered with Gypsum. Pasteurization of substrate requires elevated temps of 121°C for 4 – 5 hours which is a challenge to small growers. Methods suitable to small farmers are being developed at the University to make small growers afford growing shiitake.

Nutritional Value:

- Protein	-	13 – 18%
- Niacin	-	55mg/100g
- Thiamin	-	7.8mg/100g
- Riboflavin	-	5.0mg/100g
- Fibre	-	6 – 15%
- Fat	-	2 – 5%

Medicinal Value:

Active ingredient – “*LENTINAN*”

- Improves immune system by activating the helper “T” cells
- Controls cancers
- Slows HIV virus by increasing the CD4 cells count.

This mushroom upon drying can be ground and put into capsules or used to add value to other foods.

Reishi-Ganoderma:

This mushroom is conk-like or kidney like in shape. Its wood textured and will be 5 – 20cm in diameter, and has a shiny surface which is black brown. In nature, it grows on dead or dying trees. It's also found on tree stumps and especially bear the soil interface and occasionally on the soils arising from buried roots.

Medicinal Value:

- Improves immune system – activating the helper 'T' cells.
- Lowers blood pressure
- Cures liver disintegration disease
- Controls cancers.
- Lowers Cholesterol
- Cures Chronic fatigue syndrome
- Cures Insomnia
- Slows ageing process.
- Longevity.
- Improves well being by calming the nervous system.

Ganoderma can be consumed by grinding the dried mushroom which can be added to tea. It can also be boiled for 5 min and extract used. 5gms is traditionally prescribed per person per day. A glass per day of the extract will maintain health.

Advantages of mushroom production

Mushroom growing in Kenya is gaining popularity due to changing in eating habits. Tourism Industry is growing which is a major consumer.

Mushroom growing does not depend on the general weather since it's grown indoors. It is not a rain fed crop and utilizes agricultural wastes as growing media.

Subdivision and change of climatic patterns has made traditional crops like maize, tea and coffee unprofitable. Mushroom growing requires little space.