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Cultivation of winter Mushroom (*Flammulina velutipes*)

R.S. Sengar¹, Abhishek Singh² and Gopal Singh³

Flammulina velutipes also known as winter mushroom is one of the most cultivated edible mushrooms worldwide, especially in Asia like China, Japan and some part of India. *Flammulina velutipes* is delicious in taste and also having medicinal aspects like it has anti-cancer properties. Winter Mushroom is one of the wood decaying fungi growing on the trunks or stumps of aspens, willows, elms and broad leaves trees from the end autumn to early spring. *Flammulina velutipes* ranks sixth in terms of total world mushroom production. In addition, winter mushroom has also been reported to contain immunomodulatory, antitumor and antibiotic substances. *Flammulina velutipes* also produced biomedical compounds which help in human health and prevent many more diseases, also help in boosting immune system, help in lose body fat in gut, balance sugar level, promote the intellectual development, prevent allergy, low blood lipids, promote metabolism etc.

Winter mushroom (*Flammulina velutipes*) is one of the wood decaying fungi growing on the trunks or stumps of aspens, willows, elms and of broad leaf trees from the end autumn to early spring. It ranks sixth in terms of total world mushroom production. This mushroom is particularly known for its taste and preventive as well as curative properties for liver diseases and gastroenteric ulcers. In addition, winter mushroom has also been reported to contain immunomodulatory, antitumor and antibiotic substances.

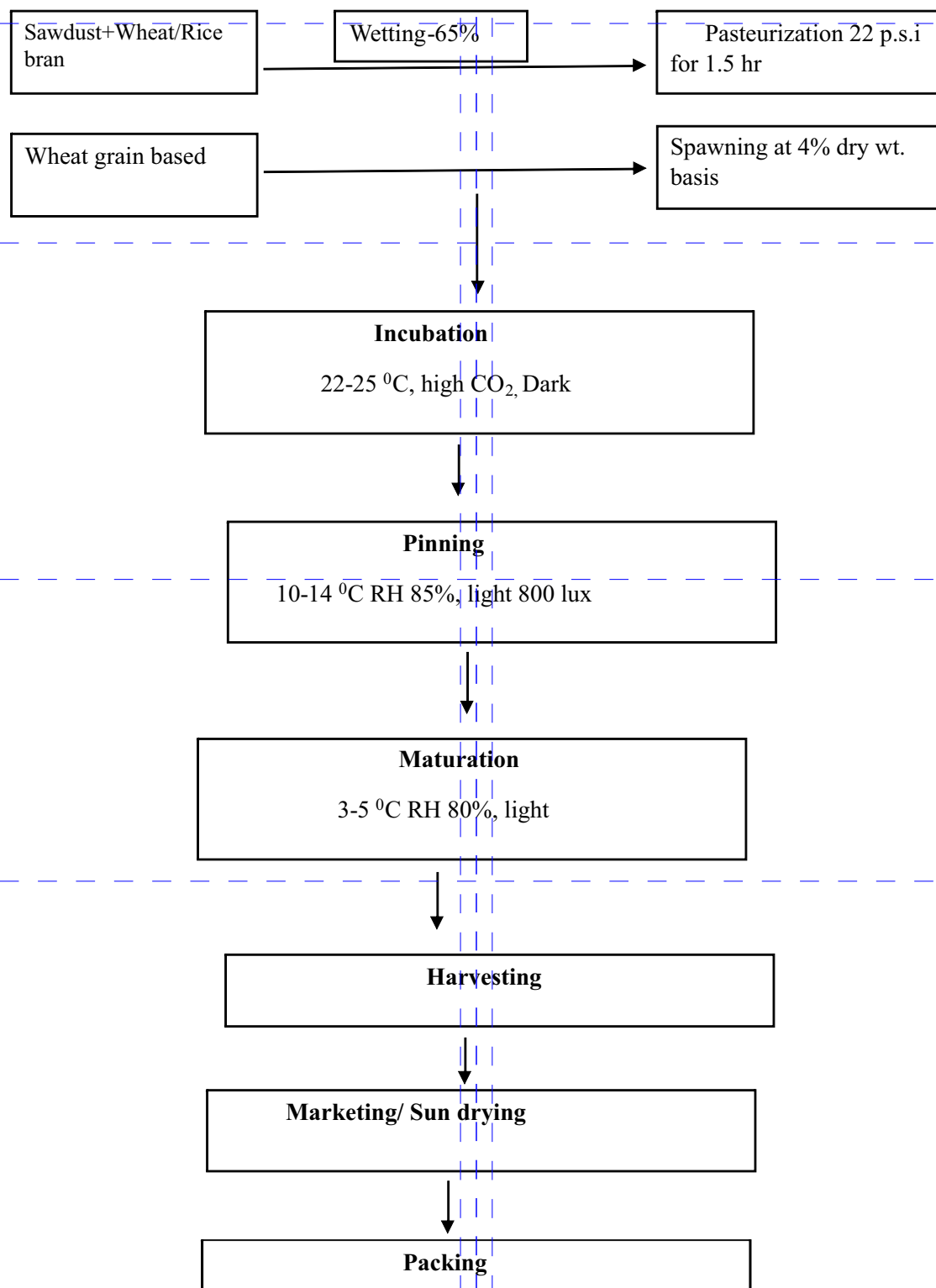
Production System

Winter mushroom can be grown during the coldest period of year. This is grown on sawdust supplemented with rice bran / wheat bran. Sawdust of broad leaf trees supplemented with rice bran / wheat bran is commonly used as substrates for cultivation of this mushroom. Sawdust is wetted thoroughly with water for 16-18 hours. Generally, equal quantity of sawdust is mixed in equal quantity of water. After wetting 5 per cent wheat bran is added in the sawdust and mixed thoroughly. This mushroom can be grown in a variety of containers like polypropylene bags, plastic bottle, vinyl bag, filter bag and jars etc. polypropylene bags (2 kg) are generally used for the cultivation. Two kg substrate is filled in each bag. The bags are plugged with non-absorbent cotton by inserting a ring on the mouth of the bag. The filled bags are sterilized in autoclaves for 1.5 hour at 22 p.s.i. After the bags have been

sterilized and cooled down to 20°C, they are inoculated with wheat grain based spawn at 4 % dry wt. basis. Sawdust spawn can also be used which growers may purchase from specialized spawn makers. Sawdust spawn is prepared by mixing ten parts of sawdust with one part of rice bran and enough water to provide 60-65% moisture content. The inoculated bags are incubated at 22-25°C. Mycelium spreads over the whole bag in 20-25 days. When mycelium spreads to 90% of the bag space, the plug is pulled off, the neck of the bag is unfolded and the surface of the media is made smooth for fruiting. Bags are then placed in the dark at a temperature of 10 -14 °C and relative humidity 80 -85% is maintained. A moisture level in the bags is important for fruiting. Primordia are formed in 10-14 days after reducing the temperature to 10-14°C. The initiation of fruit bodies starts in dark but light is necessary for the further development. At 10 -14°C, the fruit bodies grow rapidly, but they are slender long and of poor quality. For this reason, the growth of fruit bodies is controlled by lowering the temperature to 3-5°C and providing aeration for 1-2 hours daily, which encourages stiff, white and drier fruit bodies. This control is continued for 3-4 days, from the period when the cap's differentiation is observed with the naked eye to the period when the length of the stem reaches 10-12 cm. When the fruit bodies are 14-18 cm long fruit bodies are harvested (MO). They are packed in PP bags or can be sun dried. It takes

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Flow Chart of *Flammulina* production



about 50-30 days from spawning to the first harvest. After harvesting second flush appears in about 15 days. Only two flushes are harvested. About 360-400 g fresh mushrooms can be harvested from a ha. of two k

Nutritional value

Apart from their mild, fruity taste, Winter mushroom (*Flammulina velutipes*) is a good source of nutrients, vitamins and minerals. Consuming 65 gram of Winter mushroom (*Flammulina velutipes*) offers 4.571 mg of Vitamin B3, 0.878 mg of Vitamin B5, 0.146 mg of Vitamin B1, 0.13 mg of Vitamin B2, 68 mg of Phosphorus, 0.75 mg of Iron and 0.07 mg of Copper. Moreover many Amino acids 0.026 g of Tryptophan, 0.072 g of Threonine, 0.058 g of Isoleucine, 0.084 g of Leucine and 0.084 g of Lysine are also found in 65 gram of Winter mushroom (*Flammulina velutipes*).

Health benefits of winter mushroom (*Flammulina velutipes*)

It has got enoki linoleic acid as well as enoki chitosan along with being loaded with dietary fiber. Raw enoki mushroom have been proved to include around two times the fiber of cabbage. Linoleic acid, chitosan, as well as provide dietary fiber in Winter mushroom (*Flammulina velutipes*) benefits like being able to lose body fat within your gut, take control of your blood sugar levels, preventing bowel problems. Listed below are some of the popular health benefits of Winter mushroom (*Flammulina velutipes*)

1. Immune-boosting benefits

It provides a smorgasbord of nutrition as well as antioxidants. They are full of thiamin, niacin, potassium, riboflavin, pantothenic acid, calcium, copper, iron, and selenium, and low in dietary cholesterol and sodium. Amino acids valine, lysine, and ergothioneine fortify the immune-heightening properties of the enoki. Appreciated because of its health advantages, the Winter mushroom has been utilized in traditional Chinese and Japanese medication for hundreds of years like a tonic for liver disease, high

cholesterol levels, stomach ailments, and high blood pressure level.

2. Helps lose body fat in gut

It functions as a non-meat source of conjugated linoleic acid (CLA) that will assist to reduce body fat. It consists of linoleic acid which helps to decrease gut fat. It is stated to switch on enzymes liable for burning up visceral fat. Therefore, helping you drop gut fat. So, including it daily in diet will help decrease body fat.

3. Balance sugar level

There are many advantages to getting more fiber in your daily diet like lowering your levels of cholesterol as well as bringing down unwanted weight. Apart from that another benefit of dietary fiber which is it improves blood sugar control. What better blood glucose control means in weight reduction is that it leads to less sugar being stored away as fat. It is full of dietary fiber that will help you manage blood glucose levels. Spikes within blood sugar result in insulin levels to boost telling the body to store fat. However, fiber might help enhance blood glucose levels simply by reducing the effect of glucose levels on insulin. In other words, what it does is slows down the assimilation of sugar. By reduction of the influence glucose within your blood stream has on insulin, in effect you keep the body from storing fat away. Additionally, it works as a precautionary measure towards type 2 diabetes.

4. Promote the intellectual development

It consists of good amount of amino acid which could encourage and foster mental development as well as enhance memory. This become essential for the maintenance of health and conditioning the intelligence of kids, for the life extension of the aged, and also to enhance the memory of adults. It really is honored as a “fungus which encourages intellectual development.”

5. Prevent Allergy

Frequent use of Winter mushroom (*Flammulina velutipes*) helps to prevent asthma,



Winter Mushroom (Flammulina velutipes)

rhinitis, eczema as well as other allergic reactions. So include it in your regular diet to remain healthy and allergy free.

6. Lower blood lipids

Winter mushroom consumption help to prevent the rise of blood lipids, decrease cholesterol to avoid hyperlipidemia, and lower the occurrence of coronary disease.

7. Promote metabolism

Regular use of this mushroom encourages the biological activity of the body to improve metabolic process that encourages the absorption of nutrition.

Recent research development on Winter mushroom(*Flammulina velutipes*)

It contain antioxidants like ergothioneine. Animal testing has indicated possible applications in the development of vaccines and cancer immunotherapy. Research at the National university of Singapore first published in 2005, stated that the stalk of the golden needle mushroom contains a large quantity of a protein named "Five"/"FIP-fve" by the researchers, that helps in the regulation of the immune system. The mushroom also contains Flammutoxin, a cytolytic and cardiotoxic protein that has proven to be non-toxic when absorbed/taken orally.

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