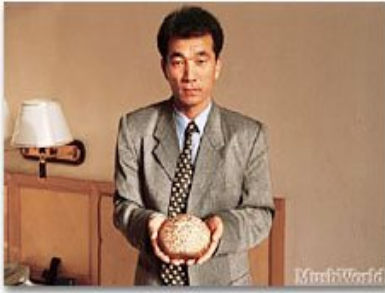


Shiitake Bag Cultivation in Korea

Writer: Richard Kang / Date :2003-04-11 / hits: 1939



Chan-gyu Choi, holding huagu
at Biyang, China

Basically, Huagu is one of the shiitake mushroom, distinguished by the flower patterned cracks on the cap and has the meaning of 'flower shiitake'.

For years, Chan-gyu Choi visited China many times to study huagu growing skill and recently began huagu cultivation in his own farm in Korea.

Bag filling

When we visited, he was working on bagging machine. Bag was 55 x 16 cm, HDPE, and has 4 filters on the surface to air circulation during incubation. Bags, filled with 2.2 kg of substrate mixture (40% of Substrate Moisture Content, SMC) gain weight to 2.6 kg (60% SMC) after sterilization. During sterilization, substrate mixture absorbs moisture through the filters (50mm of diameter) on the bag surface. Without strong sealing, substrate may escape from bag during sterilization. Metal sealing is more firm than plastic tie.



Working on bagging machine



2.2 kg substrate bag with 4 filters

Sterilization

Filled bags are moved on a hydraulic cart into double door sterilizer. Double door sterilizer has two doors, one faces bagging place and the other faces cooling room.

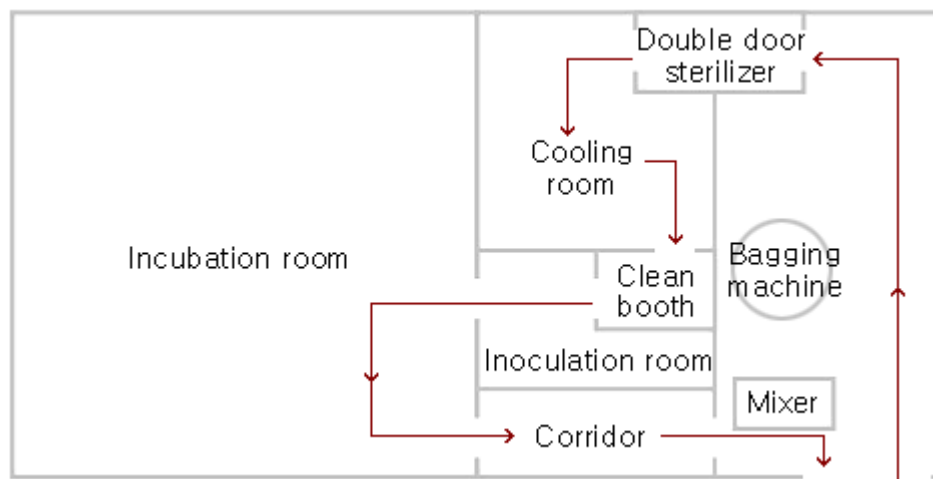




Bags on hand pallet truck

Bags in front of sterilizer

Once after the bags are moved into the sterilizer, they can not breathe fresh air until incubation completed because the house is designed as one-way to prevent contamination.



One-way voyage of a bag

Cooling

After sterilization, bags are cooled in a cooling room. Cooling room is equipped with two cooling fans and a damper to blow out the steam that generated during rapid cooling. When the bags cool down to normal temperature, they are ready to be inoculated.

After scrubbing the surface of the bags with sanitary cotton, pass them through UV lamp tunnel on roll-conveyer into inoculation room.

Inoculation

Clean booth in inoculation room is kept at positive pressure by the air from HEPA filter. Most HEPA filter of clean booth can stop 99% or more pathogen that is 0.3 micron in diameter. Almost all microorganisms can be kept away by the cleaning before inoculation and positive pressure during inoculation. In other words, contamination that may occur during inoculation is caused by dirty tools or clothes.

In this farm, a worker always wear dust-proof suit during inoculation. In order to enter the inoculation room, workers must pass through corridor where the ozone apparatus and UV lamp is

established.

Mr. Choi and his wife work together during inoculation. He makes holes with self-made punch on a bag and put the sawdust plug spawn into each hole. Then, his wife seals the hole with scotch-tape not to dry the substrate during incubation and pushes the bag tray on roll-conveyer into incubation room. [\[moving picture\]](#)



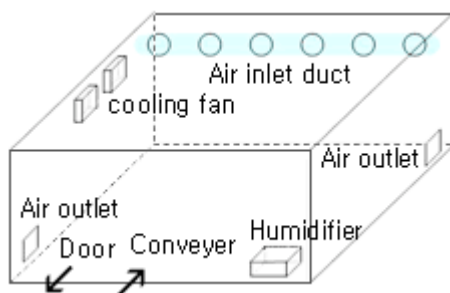
Punching and spawning



Inoculated bags

Incubation

The incubation room is 11 * 11 sq m. and is equipped with an air-inlet duct, two air-outlet holes with fan, two unit coolers and a humidifier. The floor is settled with under-floor heating system and the ceiling is settled with ozone nozzles.



Structure of incubation room



Inspection of contamination during incubation



Air-inlet duct and air-outlet fan



Colonization

I asked him about the micro-environmental variation by location. He answered, "There are certainly varying microclimate conditions at different locations, but they seem not to cause

practical difference during incubation". Bags, found to be contaminated during incubation are removed immediately. Incubated bags are moved to growing house.

Fruiting

His growing house is divided into two parts, one is ancillary room and the other is growing room. And the ceiling is made up of two stories of plastic films and shade. Water membrane flows between the plastic films. Bags are laid on the string of shelf. Being put on steel pipe, the contact surface of the bag may decay.



Ancillary room
Boiler and fan for flowing hot wind



Growing room
Duct, left (black) for hot air and center (plastic pipe) for cool air

Practically, until incubation, there is no difference between normal shiitake growing and huagu cultivation. Huagu is formed in growing house where the Relative Humidity (RH) is lower than SMC. When the RH is lower than SMC, the mushroom cells inside keep growing but the cells on the surface of the cap stop growing to make cracks on the surface. Contrary to normal shiitake growing, Mr. Choi does not remove the vinyl cover from substrate bag. The removal decreases SMC and fail to huagu cultivation.

When young pins are seen in the vinyl bag, growers should cut holes to let them grow. As the young pin grows, cracks appear on the cap by the difference of humidity. As time goes by, substrates become too dry and have hard surface. Then, water the substrate.



Cracks on the cap of young fruitbody



Watering