Rice Packaging Process in All Aspects
Qing-Juan REN
Beijing Institute of Graphic communication, Beijing, China
2829480855@qq.com

Keywords: Rice, Production Process.

Abstract. Explain the materials, processes and existing problems of rice packaging in different links, and put forward suggestions for the development of rice packaging.

Introduction
Rice is one of the most popular staple foods for Chinese residents. Rice is prone to aging, mildew, and insect pests during storage and sales, causing its eating quality to deteriorate or even lose its edible value, resulting in serious waste of food resources. Therefore, the research on rice preservation has been highly valued by food science workers at home and abroad. At present, there are many researches on rice packaging. As people's health awareness continues to increase, traditional packaging materials, such as sacks, plastic woven bags, composite plastic bags, basic packaging methods, such as vacuum packaging, inflatable packaging, these packaging forms No longer meet the needs of people's lives, more efficient, practical, low-cost high-quality rice packaging and technology is increasingly favored by consumers.

Plastic Woven Bag Production Process
The basic production process of plastic woven bags[1] is shown in Figure 1.

![Figure 1. Plastic Woven Bag Production Process.](image)

The complete production line of plastic woven bags includes: drying mixer, drawing unit, winder, circular loom, printing machine, bag cutting machine, sewing machine.

Composite Plastic Bag Process
The production process of composite plastic bags is: first make copper plate, printing, compounding, drying, forming and cutting bags. The process of composite plastic bags is very complicated, but its aesthetics and low price. The most important features are moisture-proof, mildew proof, good sealing performance, and can do multi-color printing, which is welcomed by consumers. Composite bag printing is attributed to gravure printing, and gravure printing is a plate making technique in which the picture is engraved from the outside. Generally speaking, copper or
zinc plate is used as the appearance of the carving, and some of the concave can be etched, embossed, copperplate or metal plate making, and may be printed according to the gravure printing plate. The gravure cylinder brings the ink in the ink fountain to the printing surface during the rotation process, and under the effect of the squeegee, the ink of the layout blank is scraped off. The plastic film passes between the gravure cylinder and the impression cylinder, and uses the pressure between the rollers to transfer some of the ink on the concave cylinder to the receiving object, and the solvent in the ink when the substrate passes through the drying oven. Evaporate under the thermal effect, and then enter the next unit to finish multi-color printing. Because the depth of the concave image on the printing plate is different, the depth of the ink layer that can be contained is not the same, and it is transferred to the appearance of the printed matter, and a solid and beautiful printed graphic is obtained by superimposing the ink.

**Raw Material**

**Polyethylene (PE)[2]**

Referred to as PE. It is a high molecular organic compound obtained by addition polymerization of ethylene. Polyethylene is recognized as the best material for food contact in the world. Non-toxic, odorless, odorless, in line with food packaging hygiene standards. Polyethylene film, light and transparent, with moisture, oxygen, acid, alkali, air tightness, heat sealing and other properties. It is the most important and most important material for plastic packaging printing.

**PVC--PVC [2]**

Polyvinyl chloride is abbreviated as PVC and its molecular formula is (CH2-CH2) n. It is the most important type of vinyl polymer and is the second largest plastics in the world after polyethylene.

**Shrinkfilm[2]**

Shrink film is a thermoplastic film that is stretched and oriented during the production process and shrinks during hot air treatment or infrared irradiation during use. After heat treatment, the film is tightly wrapped around the package, and the shrinkage force reaches a maximum during the cooling phase and can be stored for a long time.

**LDPE--Low Density Polyethylene[2]**

Low-density polyethylene, referred to as LDPE, is the largest variety in the plastic packaging and printing industry in various countries. The specific gravity is 0.92~0.93, which can float in water. Low crystallinity (60%), bulk polymerization at a pressure of 1000~3000kg/cm2, so it is also called high pressure polyethylene. At 23 degrees Celsius, the density is around 0.92. Applicable to food packaging, fiber packaging, and daily chemical packaging.

**HDPE--High Density Polyethylene[2]**

High density polyethylene, referred to as HDPE. It is made of low pressure polymerization, so it is also called low pressure polyethylene. It is milky white and has a poor surface gloss. The processed film can be blow molded and T-die extruded. Heat-resistant and resistant to cooking, cold and cold resistant, moisture-proof, gas-proof, good insulation performance, and not easy to break, the strength is twice that of LDPE. Very easy to open.

**BOPP--Biaxially Oriented Polypropylene Film[2]**

Biaxially stretched polypropylene film, also known as biaxially oriented polypropylene film, the English abbreviation code BOPP, which is characterized by tensile molecular orientation, mechanical strength, folded strength, gas density, moisture barrier resistance is superior to ordinary plastic film. The unit price is lower than that of cellophane compared to cellophane. Because of the excellent transparency of the film, the color reproduction after printing is particularly bright and beautiful, and is an important substrate for plastic composite flexible packaging.
Packing

Vacuum Packaging[3]

Vacuum packaging is to seal the material after the air in the bag is taken out, so as to achieve the purpose of keeping fresh and long-term preservation of the packaged object. Foreign countries first apply vacuum technology to packaging, so that the packaged articles are in an air-insulated state during storage, transportation and sales, which protects the goods and facilitates transportation and storage [8]. Vacuum packaging machinery is a machine that uses vacuum technology to isolate objects from the air. The food is vacuum-packed, which can effectively prevent the corrosion caused by oxidation of lipids and aerobic bacteria, and can prevent food from being degenerated, moldy and deteriorated. Rice can maintain the original color, aroma and taste after being vacuum-packed, and greatly extend the storage period.

Inflatable Packaging

At present, there are few reports on the preservation of rice at home and abroad, and the method of aerated packaging is adopted to reduce the problem of mildew in rice. Inflatable packaging technology combined with film packaging has been widely used to maintain crop quality and storage. The principle is to control the physiological activity of the bag by controlling the change of gas composition in the bag to achieve the purpose of preservation.

Conclusion

With the continuous development of science and technology and the continuous improvement of people's living standards, the application of packaging machinery and technology will become more and more extensive, and the variety, style, performance and quality of equipment will change and improve. From the current situation analysis, packaging machinery should achieve large-scale, continuous, intelligent, improve packaging speed, quality, adapt to more types of materials packaging, improve packaging varieties and material preservation time. Inflatable packaging and vacuum packaging bags can be used in nanometer grade, and vacuum pumps should always use oil-free dry pumps.

Acknowledgement

Special thanks are given to Mr. Yongbin Zhang for his technical help and writing assistance. This work was supported in part by National College Student Innovation and Entrepreneurship Project (Project No. 22150119004/028).

References

