VI. Retrieval and Reprocessing of Used PF

The Importance of Retrieving Used PF

Along with the application of PF in agriculture, the amount of used PF which remains in the fields is also increasing year by year. According to calculations, during the seven years from 1980 to 1986, if half the amount of PF applied in the field were retrieved and the other half remained in the field, i.e., from 0.2 to 0.25 million tonnes of used PF would remain in the whole of China. Used PF cannot dissolve into the soil and causes tilling and field management problems as well as negatively affecting the growth and development of crops. In addition, if animals accidentally eat the used PF, they will suffer from intestinal diseases. In order to prevent the pollution of cultivated land as a result of using PF, and to clear the agricultural environment, it is necessary to retrieve the used PF so that it can be recycled for further use.

Practice has proven that retrieving and reprocessing used PF are possible. In regions where PF is used extensively, retrieving and reprocessing the used PF not only prevents the pollution of cultivated land and protects the environment but also saves plastic resources and increases the incomes of farmers.

Retrieval of Used PF

Plastic Film Technology is growing in popularity, so it is necessary to disseminate information regarding the damage caused by used PF if it remains in the fields. It is necessary to inform farmers that PF can increase the yield of crops and has various benefits, but that it also pollutes the agricultural environment. This way farmers can be mobilised to retrieve the used PF. It is a good idea to establish a convenient network for farmers, so that they can sell the used PF and collect it easily for reprocessing. In addition, a reasonable purchasing price should be fixed to encourage the farmers to collect and sell the used PF.

Reprocessing the Used PF

Previously, in some places the used PF was retrieved and was either burned or buried. Burning and burying does not eliminate the pollution caused by used PF in the agricultural environment but rather wastes the plastic resources and the labour expended in collecting the used PF.

At present, some reprocessing factories have been established in the region where PF is extensively used. According to estimates made, if there are more than 1,500 to 2,000 hectares of cultivated land under PF in a country, a reprocessing factory should be established to recycle the used PF. The size of the reprocessing factory depends upon how much of the used PF can be retrieved. For example, to establish a reprocessing factory which has the capacity to produce a 100 tonnes of granular materials, a 100 square metres for the workshop, a 100 square metres for the storehouse, 300 square metres for the air-drying yard, a 100 square metres for the dumping ground, and necessary equipment, such as two material-washing machines, three extruding machines, and one granule-cutting machine, are required. In China, this type of factory requires a sum of from 18,000 to 20,000 *yuan* (3,333-3,703 US$). Generally, if 100 tonnes of reprocessed granules are produced, a profit of from about 20,000 to 30,000 *yuan* (3,703-5,556 US$) can be realised.

The reprocessing method is very simple. The used PF can be reprocessed to produce granular materials or recycled products for the market.

Production of Granular Materials

The production method can be divided into three steps.

1) Washing the Used PF. The retrieved PF has to be washed manually or by machine. The quality of the reprocessed granules and products depends upon the degree of cleanliness. The Agricultural Technology Extension Centre in Suizhong County, Liaoning, has a machine which is 12 times more efficient than manual washing and the machine not only increases efficiency but also guarantees cleanliness.
2) Melting and Extruding. The cleaned PF is placed in the extruding machine whee it is melted into rough, low density material. The materials are then placed in the second extruding machine and, through continual heating, a dense sticky paste is extruded. This material is then placed into the third extruding machine where it is heated once more to produce a brightly coloured density strip material 0.3 to 0.4cm in diameter. In this procedure, the key point is temperature control. Accurate and appropriate temperatures guarantee that the reprocessed material is of high quality.
3) Cutting. The reprocessed strip material is placed in the cutting machine and cut into granular material of from 0.5 to 0.6cm in diameter. When the reprocessed slips are cut and packed, it must be ensured that miscellaneous objects are not mixed with the granules in order to guarantee the quality of the reprocessed product.

Manufacture of Reprocessed Products

Granular materials can be processed into various products of daily use such as bicycle handle sleeves, decorative household items, shoe heels, plastic pipes, washboards, and bottle caps. The manufacturing process depends upon the shape of the products. For example, products with simple shapes can be manufactured as described below.

Put the hot and sticky paste material from the second extruding machine into the mould which is designed according to the required shape. Through extruding and pressing, the reprocessed product is directly manufactured. This production method shortens the working procedure, reduces costs, and enhances benefits. To manufacture products that are heavy and which need to be continually processed, for example, plastic pipes, the granular materials are melted again and then the melted materials are placed in special machines and special moulds and, through extruding and shaping, the plastic pipes are manufactured. Since the special machines and moulds are very expensive, establishing this type of factory requires more investment, and it is necessary to study the feasibility and construction plan before establishing the factory. According to Chinese experience, a reprocessing factory should be set up in regions where there are more than 20,000 hectares under PF.

Retrieval and reprocessing of the used PF have certain economic benefits. Generally, production of one tonne of granular material can yield an income of 200 to 300 *yuan* (37-55.5 US$); if the granular material is processed into one tonne of reprocessed products, it will yield an income of 300 to 600 *yuan* (55.5-111.1 US$). If the factory is managed properly, the quality of products from the recycled material will be good and so will the economic benefits.