



Billion pounds of waste nut shells and fruit pits available annually poses challenge to research workers

METHODS of using half of the 2 billion pounds of nut shells and fruit pits which are produced annually has been the subject of considerable research in recent years. The Northern Regional Research Laboratory, U. S. Department of Agriculture, has carried out much work in this area particularly with regard to commercial utilization of those agricultural residues which accumulate in sufficient quantities to process commercially.

Included in this category are pits of apricots, cherries, peaches, and dates and the shells of almonds, coconuts, filberts, peanuts, pecans, and English and black walnuts.

T. F. Clark and E. C. Lathrop of USDA have prepared a paper summarizing progress in this field ("Nut Shells and Fruit Pits—Their Composition, Availability, Agricultural and Industrial Uses"). They note that while attempts to utilize these products are not new, only in recent years have practical uses been found and exploited.

Successful utilization of such residues, they state, requires the establishment of economical methods for collecting, purchasing, and preserving nut shells and fruit pits. Also required is the establishment of uses based on superior or unusual chemical and physical properties of these wastes. Production of materials having little value must be avoided and sound merchandising and business management must be maintained.

Failure of prior methods often resulted from failure to apply the above mentioned principles and also from the false assumption that these materials are available at little or no cost for the production of low cost substitute materials.

Many Agricultural Uses

Shells from peanuts, almonds, and walnuts find varied uses in fertilizers,

insecticides and pesticides, mulches, and animal and poultry feeds.

The ground materials provide bulk, retard caking, and improve flow characteristics of fertilizers. When mixed with nitrogen-carrying chemicals, they may be used as soil conditioners.

Flour from these shells is used as a carrier for those insecticides, fungicides, and herbicides which must be diluted with a nonliquid to avoid overdose and to provide uniform and maximum coverage. These flours are free of objectionable flavor, color, and toxicity and flow freely without lumping. Foaming of suspensions is overcome by blending with antifoam agents.

The highly absorbent properties render them useful for mulching agents and for use on floors of poultry houses. Press cake made from shells for livestock feed is considered a poor substitute for usual feeds. Charcoal prepared by destructive distillation, however, is incorporated in feeds.

Miscellaneous uses include fill for low ground to improve drainage, replacement of crushed stone in driveways, and to make smoke for curing meats.

Varied Industrial Uses

Soft grits from shell materials and corn cobs are finding considerable use in air-blast cleaning of precision finished machine parts. When combined with rice hulls, the abrasive action is accelerated as these hulls have a high silica content (18–20%). This method does not remove metal and so avoids dimensional changes.

A typical use is in removing carbon, oil, and products of corrosion in aircraft and automobile engines. The labor and time involved in conventional soaking and scraping is reduced and the fire hazards and personnel injuries involved in using solvents is avoided.

Other uses are in cleaning molds used for hard rubber products and for tires, finishing precision parts such as automatic transmissions and torque converters, and removing rust, scale, lacquer, and paint from metal surfaces.

Soft grit blasting is used in finishing molded plastics and hard rubber products and in cleaning glazed enamels and porcelainware. Grits may be used in tumbling method finishing of plastics, hard rubber, and metal die castings.

These materials are also used in fur cleaning and as mild abrasives in hand soaps.

Ground nut shells and fruit pits are incorporated in bricks and ceramic ware to control porosity as these materials burn out when the clay products are fired.

Finely ground hulls are used as fillers in phenolic molding compounds and hard rubber goods. They act as antislip agents when incorporated in natural and synthetic rubber and plastic type coatings. Superior traction and non-skid properties are claimed for automobile and tractor tires in which are incorporated coarse particles from shells or corncobs.

Ground peanut shells are used with binders as substitutes for cork in crown closures. Efforts to use peanut shells to make structural board materials do not appear to be competitive with similar products made from wood wastes.

Flour from these materials is also used to extend and strengthen the bonding effect of plywood bonding resins.

Potential Developments Cited

One use calls for extremely fine flours which are used to dust the interior of sand molds as the burning of the flour forms a gaseous cushion between the molten metal and the sand producing smoother castings.

In wood finishing uniform grained finishes can be obtained by coating a surface with a thin white opaque coat and then air blasting dry pigments carried by fine grits. Ordinary staining and finishing time can be reduced 75% by such air blasting.

Shells and pits and ground corncobs also find use as absorbents for nitroglycerine in the manufacture of dynamite.

Except for special charcoal and activated carbon, the wide variety of products obtained by destructive distillation of shells and pits generally are unable to compete with similar products obtained from natural gas and coal. These include charcoal, gases, phenolic compounds, acetic acid, tar acids and pitch.

Certain products present, which are not recovered commercially or recovered only to a limited degree include, cutin, a wax-like material found in walnut shells, oils found in date stones and cherry pits, and tannins found in pecans and other shells and pits.