Potato pulp: Agricultural waste with technical potential

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ABSTRACT

The potato-processing industry has developed methods for providing effective removal of settleable and dissolved solids from potato-processing wastes. Potato pulp is a waste product when potato starch is produced. It consists of potato peel, remnants of the cell walls, traces of starch and 85 to 90 percent water with dissolved mineral salts. Usually, most of the potato pulp is used as cattle feed. We developed approaches that demonstrate potato pulp has, in addition, some technical potentials. Addition of dried potato pulp granules to the mass (woodchips) used for the production of particle boards (e.g. components of furniture such as wardrobe closets) results in a drastic reduction of the amount of formaldehyde or isocyanate usually applied as a “glue” for mechanically stable particle boards. A variation is the treatment of potato pulp by pressure release resulting in a fine powder, after drying process. It can be emulsified in water and then be used as a glue replacing conventional glues for paper products, provided heat and pressure are applied for a proper function.

Keywords: Potato starch, potato pulp, technical potential, particle boards, glue.

INTRODUCTION

Potato starch is one of the main sources of starch for all those applications where starch is needed for industrial products (paper, corrugated cardboard, substrate for the fermentation industry, bioethanol, food industry) (Grüll et al., 2006). Other sources for starch are corn, wheat, manioc, rice, sago palms, sweet potato etc.

During the potato campaign in Europe huge amounts of potato pulp were piling up. Most of this potato pulp is used as cattle food. The remaining pulp can be used for fertilization purposes (Kozich et al. 2009). After a few days, potato pulp develops an unpleasant smell due to the activity of microorganisms, especially bacteria (Mayer and Hillebrandt, 1997).

MATERIALS AND METHODS

We developed approaches that demonstrate that this situation can be avoided if fresh potato pulp is used for potato pulp-specific technical applications. Our approach is described in detail in two patents (DE 4020969 C 1. 1991. Mayer et al.; EP 0732386 A 1.1996. Mayer et al.). In principle, the water content of the pulp is removed by drying in hot air at a temperature around 85 to 90°C, with a final water content of 6 to 10 percent. Afterwards, the dried pulp is transformed into granules (1 to 3 mm in size) by a grind process (heating is avoided).

A variation of the treatment of fresh potato pulp is the application of pressure release followed by air or vacuum drying. The result is a fine powder.

RESULTS

The potato pulp granules mentioned above were added to woodchips when particle boards are produced (for details, see the above mentioned patents). Due to the well defined drying temperatures for the production of the granules, they maintain their property as a water-based “glue” in the first step of particle board production (interaction with the surface of the woodchips by mixing, heating avoided). Then the main process implies application of well-controlled pressure and a temperature range significantly above the drying temperature during the drying of the pulp. Under these conditions the pulp “glue” is baked, and the drying pulp granules harden and solidify the woodchip-pulp mixture.

It is remarkable that, by application of this approach, the amount of formaldehyde or isocyanate, generally used as the “glue” in the particle board production, is
drastically reduced – with favourable implications for health.

Potato pulp “glue” produced by pressure release as mentioned above has also a technical potential: it can replace, as a water-based glue when emulgated in water, conventional water-based glues, e.g. in the manufacture of paper products such as letter envelopes etc., provided heat and pressure are involved in their production.

REFERENCES
Patents: