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Physical and degradable properties of mulching films prepared from natural fibers and biodegradable polymers

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The use of plastic film in agriculture has the serious drawback of producing vast quantities of waste. The use of biodegradable films in agriculture can promote sustainability, reduce soil contamination and increase the use of renewable raw materials obtained from agro-industrial waste. In our study, films were prepared from natural fibers and biodegradable polymers as potential substitutes for the conventional non-biodegradable plastic film used as mulching material in agricultural production. The physical properties (e.g. mechanical properties, heat preservation, water permeability and photopermeability) and degradation characteristics (evaluated by micro-organic culture testing and soil burial testing) of the films were studied in both laboratory and field tests. The results indicated that these fiber/polymer films exhibited favorable physical properties that were sufficient for use in mulching film applications. Moreover, the degradation degree of the three tested films decreased in the following order: Fiber/starch (ST) film> fiber/poly(vinyl alcohol) (PVA) film> fiber/polyacrylate (PA) film. The fiber/starch and fiber/PVA films were made from completely biodegradable materials and demonstrated the potential to substitute non-biodegradable films.

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