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Nitrogen Management in Rice Cultivation Using Rejected Sago Starch Coated Urea Prills

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Rejected sago starch (RSS) was used as a coating material for urea encapsulation to prevent rapid loss of nitrogen (N). The RSS slurry served as the inner layer coated with dried RSS as the outer layer without any additives such as a binder or plasticiser. A pot study was conducted for 120 days to determine the effects of RSS-coated urea on N recovery, N uptake and N use efficiency (NUE) in rice cultivation compared to uncoated urea. RSS-coated urea effectively retained soil total N due to a thin wall layer embedded in homogeneous RSS that formed capsules to protect the urea surface from being rapidly hydrolysed when reacting with soil water. RSS-coated urea not only improved soil N retention; but also enhanced the number of leaves, number of tillers, number of panicles, and root length of rice cultivated in tropical acid soil. RSS-coated urea improved N uptake and NUE, thus enhancing rice growth performance through sufficient N in soil for rice plants to assimilate. Urea prills could be coated with natural biopolymers such as RSS to improve N recovery, N uptake and NUE in rice cultivation compared to uncoated urea. RSS could potentially reduce adverse environmental impacts from the indiscriminate use of chemical-based coating materials for urea prills.

Keywords: Coated urea, natural polymer, retention; starch, uptake