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Development of a Continuous High-Speed Single-Kernel Brown Rice Sorting Machine Based on Rice Protein Content

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To select kernels for breeding that have required constituent content from either naturally distributed samples or artificially mutated ones, it is necessary to process batch samples in a short time. The constituent content of single-kernel grains such as wheat and rice has been determined using conventional bench type NIR instruments; however, it takes a lot of time and effort. Shizuoka Seiki (Fukuroi-city, Japan) and NFRI (National Food Research Institute) of MAFF (Ministry of Agriculture, Forestry and Fisheries of Japan) have jointly developed a continuous high-speed single-kernel brown rice sorting machine based on rice protein content. It consists of several sections such as a feeding mechanism, measuring unit, sorting mechanism and controlling PC. The feeding mechanism picks up single-kernel brown rice from the hopper (maximum of 5kg storage capacity) and sends it to the measuring unit. A spectrum of the brown rice is obtained in the measuring unit, which consists of a near-infrared array sensor. The brown rice is then sorted in the sorting mechanism based on its protein content estimated by the controlling PC. In the present study, measuring speed was approximately 500ms for the full spectrum range and overall sorting speed was approximately 2.8s for one kernel. Accuracy of estimation was approximately SEP=0.5% of dry matter protein content for nonglutinous rice