

Site-specific farming has been developed to the level that enables profitable use. The problem of its application in developing countries is high costs of needed equipment. The objective of research was to develop a low-cost system for application of precision farming. The system consists of low-cost GPS receiver connected to the PLC. The test of the system applicability for local specific spraying of herbicides, following previously defined weed spots was done. The encouraging results have been obtained. The precision of spraying could be enhanced using new generation of receivers with higher frequency rate and accuracy and including additional parameters for the PLC calculations. Keywords: GPS, IEC 61131-3, PLC, site-specific farming

1. INTRODUCTION After the removal of Selective Availability (SA), GPS accuracy was increased about ten times – from about 100 m to about 10 m. Using free of charge, satellite-based differential GPS systems (DGPS), e.g., EGNOS in Europe, WAAS in North America and MSAS in Asia, it is possible to achieve accuracies less than 5 m with a stand-alone unit (Rizos, 2001; Upadhyaya et al., 2005). The requirements for positioning in agriculture are specific (Sharpe et al., 2005; Gavrić and Martinov, 2006). Fields at flat terrains, like Vojvodina – Northern Province of Serbia, are the most appropriate for GPS applications, because of the good satellite visibility (Sekulić et al., 2004). This paper describes a system which consists of GPS device that uses a free of charge, satellitebased differential GPS signal (EGNOS) and a programmable logic controller (PLC) programmed on the basis of IEC 61131-3 standard. The basic requirement set before the system is that it can be shared among several tractors. The requirements set before the PLC program are that its development and maintenance are simple and transferable to other PLC devices, it is done with the IEC 61131-3 language choice, and that it permits complex calculations using floating point arithmetic. Preliminary results have shown that this system enables the application of site specific farming on tractors equipped with implements without ISOBUS support. Functioning of the system was tested for application of fixed amounts and concentrations of herbicides in previously identified field spots containing population of weeds.

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2.2. MATERIALS AND METHODS Garmin Etrex Legend, which is commercially available, was selected for use as a typical lowcost handheld GPS device (Rizos, 2001). It is capable of receiving EGNOS DGPS signal. GPS device was mounted on the top of the tractor cabin. PLC device was mounted in tractor cabin and connected, via serial cable, to the GPS device which sends NMEA messages. From the set of NMEA messages, GPRMC was selected because it contains information about all important parameters – GPS position, current speed and direction. Figure 1 shows the system in operation.

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