THE COMPARISON OF THE NOZZLE INSPECTION METHODS IN FIELD CROP SPRAYERS:
NOZZLE FLOW VS. SPRAY TRANVERSE DISTRIBUTION –
METHODOLOGY AND SOME RESULTS*

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Introduction: The European standards (EN 13 790-1, EN ISO 16122-2) and some national procedures for the inspection of field crop sprayers in use allow two methods of evaluation of the nozzles. In only a few countries both methods of the nozzle inspection - measurement of nozzle flow and transverse distribution – are used [Wehmann 2012]. In the majority of countries only measurement of the transverse distribution of the spray is carried out, with the coefficient of variation CV% as a measure of accuracy.

The comparison of the nozzle inspection methods have not been carried out in a direct way. Therefore, it is not known which of these methods is more rigorous, and if both methods could achieve the same results. In order to compare the stringency, costs and time-consuming of both inspection methods, the methodology of comparative tests have been elaborated. Then some trials were carried out.

Materials and Methods: The elaborated methodology describes how to compare and what criteria to use for the evaluation of methods of inspection nozzles in field crop sprayers. In the study, three types of Lechler nozzles were used (utilized for less than one hour): flat fan standard (LU 120-03) at 3 bar, flat fan air-injector (ID 120-03) and Twin flat spray air-injector compact nozzles (IDKT 120-03) at 4.5 bar. During the tests the electronic spray pattemator SPRAYER TEST 1000 (PESSL Instruments, Austria) and the groove pattemator (STABEN - "operator data readout") was used. The nozzle flow was measured by set of 20 scaled cylinders (SCHACHTNER of nominal capacity 2000 ml and accuracy 20 ml with HERBST nozzle adapters) and a ball flow-meter LURMARK. For each of the evaluated method the time of each repeatable action was measured and the results of the measurements were not repeated.

Table 3. The simulated cost of a field crop sprayer inspection (1 worker) depending on nozzle inspection method, boom length and number of nozzles sets mounted on it, workshop worker salary and the number of inspections per year. The rotational use allow two sets of nozzles mounted on the boom 36 m. The method used as well as binary and linear assessment the test result.

The results of the flow or transverse distribution measurements may be expressed as simple number / percentage of nozzles with flow deviation from nominal value or as a linear assessment and repeatability.

The choice of the method of nozzle inspection may depend on the number of inspections done in a workshop per year. The simulated cost of a field crop sprayer inspection (1 worker) depending on nozzles inspection method, boom length and number of nozzles sets mounted on it, workshop worker salary and number of inspections per year.

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Conclusion: 1. The comparison of the nozzle inspection methods may be done in by the evaluation of repeatability of the measurements and the costs of the inspection.

2. The results of the flow or transverse distribution measurement distributions may be expressed as simple binary Yes/No assessment or as a linear assessment giving the answer: which one of the methods is more rigorous or how far is the measurement result from the limit value.

3. The choice of the method of nozzle inspection may depend on the number of inspections done in the workshop.

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