Intention of herbicide band application and inter-row cultivation in maize using RTK-GPS systems

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MATERIALS AND METHODS

T1 Post-emergence herbicide band application (mesotrione and prosulfuron at 30 and 7.5 g a.i. ha⁻¹ corresponding to 50% of label dose, prototype inter-row cultivator, nozzles Tecsi 02-110, pressure 2 bar, volume of spray 180 L ha⁻¹)

T2 Pre-emergence band application (thiencarbazone-methyl and isoxaflutole at 12 and 30 g a.i. ha⁻¹ corresponding to 33% of label dose, Gaspardo seeder, nozzles Teejet TP0802EVS, pressure 2 bar, volume of spray 100 L ha⁻¹)

T3 Pre-emergence broadcast application (T3, thiencarbazone-methyl and isoxaflutole at 36 and 90 g a.i. ha⁻¹ corresponding to full label dose, Barigelli sprayer, nozzles Teejet TP11002VP, pressure 3 bar, volume of spray 200 L ha⁻¹)

Inter-row cultivation, fertilization and irrigation were applied similarly for all treatments. All operations were performed with tractors equipped with positioning and auto-steering systems based on RTK/GPS technology. A completely randomized design with replicates (0.25 ha each) was set up. Weed samplings were conducted before and three weeks after post-emergence herbicide application and at crop harvest to evaluate weed density, botanical composition and control efficacy.

RESULTS AND DISCUSSION

Weed density before control operations ranged between 15 and 30 plants m⁻² with typical summer species (Solanum nigrum, Amaranthus spp., Chenopodium album, Convolvulus arvensis). Optimal weed control (low weed biomass at harvest) and good yields (treatment mean of 7.5 t ha⁻¹ of fresh matter of silage maize) were achieved without significant differences for all tested systems, underlining the feasibility of herbicide band application integrated with inter-row cultivation for low chemical input weed control in silage maize. Further field experiments are ongoing in 2018 in other sites to confirm these results.

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Integration of herbicide band application and inter-row cultivation in maize using RTK-GPS systems

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Reducing herbicide use is an important step to decrease environmental impact and the risk of herbicide resistance evolution by reducing selection pressure on weeds. Herbicide application localized along the crop row can contribute to lower chemical input for weed control. A field experiment was conducted at CAB Massari farm (Conselice, RA, Northern Italy) to evaluate herbicide band application systems for silage maize.

Treatments consisted of post-emergence herbicide band application (T1, mesotrione and prosulfuron at 30 and 7.5 g ai/ha corresponding to 50% of label dose, prototype inter-row cultivator, nozzles Tecsi 02-110, pressure 2 bar, volume of spray 180 L/ha), pre-emergence band application (T2, thiencarbazone-methyl and isoxaflutole at 12 and 30 g ai/ha corresponding to 33% of label dose, Gaspardo seeder, nozzles Teejet TP0802EV, pressure 2 bar, volume of spray 100 L/ha) and pre-emergence broadcast application (T3, thiencarbazone-methyl and isoxaflutole at 36 and 90 g ai/ha corresponding to full label dose, Barigelli sprayer, nozzles Teejet TP11002VP, pressure 3 bar, volume of spray 200 L/ha). Inter-row cultivation, fertilization and irrigation were applied similarly for all treatments. Weed samplings were conducted before and three weeks after post-emergence herbicide application and at crop harvest to evaluate weed density, botanical composition and control efficacy.

Weed density in untreated areas ranged between 15 and 30 plant/m² with the presence of typical summer species (Solanum nigrum, Amaranthus spp., Chenopodium album, Convolvulus arvensis). Optimal weed control and good yields (about 7.5 and 2.5 ton/ha of fresh and dry matter) were achieved without significant differences for all tested systems, underlining the feasibility of herbicide band application integrated with inter-row cultivation for low chemical input weed control in silage maize.

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