STEM INJURY EFFECTS ON INDUSTRIAL HEMP GRAIN AND BIOMASS YIELD IN NORTH DAKOTA

Darin J. Eisinger[1], Mark E. Zarnstorff[2], and Burton L. Johnson[1]

[1]North Dakota State University, Fargo, ND, USA
[2]National Crop Insurance Services, Overland Park, KS, USA

Crop plant injury from weather related events such as hail storms and wind can cause broken or cut off stem damage that reduces crop grain and biomass yields. Studies were initiated to quantify stem damage effects on industrial hemp (*Cannabis sativa* L.) grain and fiber yield in collaboration with the National Crop Insurance Services. Experiments were conducted at the North Dakota State University Prosper off-station research site located approximately 24 km NW of Fargo, ND, USA, in the 2021 and 2022 growing seasons. Studies were a RCBD with a factorial treatment arrangement with 4 replicates and experimental units consisting of 6-rows spaced, 30 cm apart, and 4 m in length. Treatments involved three factors (i.) cultivars, (ii.) growth stage (13, 55, and 67), and (iii.) stem injury (non-injured control, cutoff, and broken-over). Hemp cultivars Katani and Canda are diecious and monecious, respectively. Traits determined were grain and fiber yield and stem injury response categorized as straight (non damaged), gooseneck, and branched. The growth stage (GS) by stem injury (SI) interaction indicated grain yield reduction increased as growth stage advanced with the greatest grain yield reduction for the stem cutoff treatment and less yield reduction for the broken-over treatment when compared with the control. Greater grain and fiber yield reduction for the cutoff compared with broken-over stem injury treatment was related to cutoff plants having to regrow stems (branches) from leaf node axillary buds whereas broken-over stems either straightened or developed a gooseneck. As treatments were applied at later growth stages the level of straightened stems decreased and goosenecks increased. For the stem cutoff treatment branching from lower stem nodes was more common at earlier stages and branching at higher leaf nodes was more common at the later growth stages. The GS main effect and GS x SI interaction were not significant for fiber yield, but the main effect of SI indicated a 12 and 33 percent reduction in fiber yield for the broken-over and cut off stem treatments, respectively, when compared with the control. These studies are ongoing and provide the base information for formulating stem damage loss charts for industrial hemp crop loss procedures.

Contact: B.L. Johnson, Dept. of Plant Sciences, NDSU Dept. # 7670, PO Box 6050, Fargo, ND 58108. USA. Tel: 701-231-7971. E-mail: burton.johnson@ndsu.edu