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to foreign objects. This unique stem structure and composition allows bedstraw to act as a pseudo-vine without twining or producing tendrils. (120)

Effect of surface litter on seedling emergence and establishment of European buckthorn (Rhamnus cathartica). Bisikwa, J.[1], Becker, R.L.[1], Jordan, N.R.[1], Biesboer, D.D.[2], Katovich, S.A.[2] and Forcella, F.[3] [1]Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN, [2]University of Minnesota, St. Paul, MN, [3]USDA-ARS, Morris, MN. We determined the effect of surface litter depth on emergence and establishment of buckthorn at Eagle Lake Regional Park, Maple Grove, MN and in the greenhouse in 2002 and 2003. We also investigated effect of litter on the physical environment of seedlings to determine mechanisms underlying observed patterns in buckthorn seedling emergence. Results from our study showed that increasing litter depth resulted in decreased buckthorn seedling emergence and establishment in both field and greenhouse experiments. Among litter treatments, the deepest litter depth, resulted in the lowest buckthorn seedling densities, while no-litter control treatment (bare-ground) resulted in the highest seedling densities, in the greenhouse and field, respectively. In addition to reduced seedling emergence litter cover reduced buckthorn shoot height and biomass. Deeper litter cover decreased solar radiation at the soil surface, thus reducing soil temperatures and increasing soil moisture retention. In the greenhouse, soil temperature decreased with increasing litter depth. Regression analysis showed that light transmittance and soil temperature influenced buckthorn seedling establishment in the greenhouse while in the field only light transmittance influenced seedling establishment. Thus, litter may suppress buckthorn seedling establishment via reduced soil temperatures and light interception. Soil moisture, while higher with increased litter depth, likely is not differentially limiting buckthorn seedling establishment. However, since there were various canopy layers in the field (i.e. overstory oak trees and understory shrubs) reducing photosynthetically active radiation (PAR) at the forest floor to 20% of light incident on the overstory forest canopy, soil temperatures seemed not to be further affected by litter cover. According to our findings, litter cover has the capacity to reduce buckthorn seedling recruitment and establishment but can not completely prevent seedling emergence and survival. Thus, management strategies should be designed to control the establishment of buckthorn seedlings in order to prevent further buckthorn populations from establishing. (121)

Germinability, emergence response and seed depletion of wild oat under various soil conditions. Asai, M.[1,*] [1]National Agricultural Research Center, Tsukuba, Ibaraki, Japan. Wild oat is a problematic weed in winter wheat in central Japan. Field experiments were conducted to evaluate the effects of disturbance regime, burial depth and straw mulch on the germinability and persistence of a selected wild oat population. Wild oat seeds were sown on the soil surface in early July and subjected to four different tillage dates (August 11, September 9, October 10, November 12) and a no-till treatment. Monitoring of seedling emergence indicated that delayed tillage hastened emergence flush and decreased emergence after mid November. Viable seeds recovered the following May were detected only in the August tillage plot. In June 2004, seeds were placed on the soil surface and at 5 cm depth both within and outside soybean rows. Seeds were periodically recovered for germination tests. Percent recovery was lower in surface trials than at 5 cm depth. Onset of emergence in surface-planted seeds was early October, whereas buried seeds did not emerge until late October. Surface-planted seeds showed an increase in upper limit of germination temperature earlier than did buried seeds. Emergence response was also monitored under no-till and straw-mulched conditions and with and without chicken wire to exclude mammalian herbivores. Seedling emergence was highest in mulched trials with double the amount of straw, followed by standard-mulched and tilled. Viable seed recovery was greatest in tilled trials, followed by mulched with wire, but wiring had no effect on total emergence. The results indicate that both mammals and invertebrates contribute to depletion of soil surface seeds. Earlier emergence of wild oat under no-till conditions is thought to have derived from an expansion in the range of germinable temperature of the soil surface seeds. The shift in time of emergence possibly explains how wild oats have adopted habitats with differing disturbance regimes, e.g. arable fields and field margins. (122)

Do high-density weed infestations contribute to the severity of drought stress in maize? Berger, A.G.[1,♦], McDonald, A.J.[1,♦] and Riha, S.J.[1,♦] [1]Department of Earth and Atmospheric Sciences, Cornell University, Ithaca, NY. Conventional wisdom suggests that water transpired by weeds exacerbates drought in dry periods and that heightened moisture deficit is a key mechanisms by which weeds cause crop yield loss. There are, however, few empirical data that support this hypothesis. In this additive experiment, maize was established in monoculture and in combination with high-density stands of three annual weeds (velvetleaf - *A. theophrasti* M., redroot pigweed - *A. retroflexus* L., giant foxtail - *Setaria faberi* Herrm.). From maize V6 through anthesis, soil water was measured to a depth of 1.25m in 18cm increments. Despite exceptionally dry conditions, we found no evidence that the maize-weed mixtures had less soil water than the maize monocrop. Aggregated over 1.25m, stored water for the mixtures was never more than 6mm less than the pure maize stands and similar moisture values were consistently measured at all soil depths. This parity was also reflected in cumulative water depletion, with the maize monoculture acquiring 160mm of water and the mixtures ranging from 136mm (*A. theophrasti* - maize) to 153mm (*A. retroflexus* - maize). During early August when rainfall was low, estimates of leaf diffusive resistance suggested that the maize in mixture (3.29 ± 0.177 s cm^{-1}) experienced similar levels of water stress as monoculture maize (3.49 ± 0.188 s cm^{-1}). Together, these data imply that soil water dynamics and drought severity were not significantly affected by weed competition. The similarity of canopy light interception for maize systems with and without weeds may explain the somewhat counter-intuitive nature of our findings. (123)