

HOW WEED COMMUNITIES RESPOND TO CHANGING ENVIRONMENTS. J. Anita Dille, Assistant Professor, Department of Agronomy, Kansas State University, Manhattan, KS 66506.

The phenomenon of weed community shifts is expected and inevitable. A community is an assemblage of species populations, which occur together in space and time. A shift would occur when the assemblage changes. The environment and its numerous constraints structure a plant community. These constraints are impacted and changed in significant ways by our activities as humans. Available resources, such as N, P, K, S, water, light, and others, are limited. Appearance of new species in a community is limited by lack of dispersal and recruitment. The presence of predators and pathogens also restrict establishment of new species. Disturbance removes the current vegetation and opens up gaps for new species to arrive, and includes fire, windstorms, grazing and hooves, tillage and chemical applications. Plants have optimal growth conditions and competitive abilities at particular temperatures and thus, in particular climates. Plants respond to mean levels of limiting factors as well as to extent and patterning of fluctuations in time. In total, a large number of environmental factors and processes limit the abundance of species populations in communities. Weed communities respond to these environmental constraints through ecological principles of biodiversity, selection and succession. Biodiversity can be characterized by the number of different weed species present, the genetic and phenotypic variation within a species, and by the development of unique biotypes of a given weed species. Both natural and artificial selection pressures influence community shifts when examined from a long-term to short-term perspective. Selection acts on individuals within a population that occur within a community. Successful selection results in that individual surviving, reproducing, and leaving descendants in a given environment and not in another. Thus, there is the potential for a shift in genotype and weed species over time. Succession is the non-season, directional and continuous pattern of colonization and extinction on a site by species populations. As disturbance is reduced, species populations adjust to the new environment created and in the example of old field succession we observe shifts from annuals to herbaceous perennials to shrubs and woody species. There are several methods to document weed community shifts. For example, the use of general surveys of weed species populations in a field over many years or specific surveys in response to imposing different environmental constraints would allow us to document changes. Diversity of a weed community can be measured using diversity indices in order to document dominant and rare species occurrences. With information about weed characteristics and changes in environmental constraints, and understanding historical shifts that have been observed, it may be possible to model and predict future weed community shifts.

The speakers in the “Weed Community Shifts” symposium: Doug Buhler, David Heering and Frank Forcella, will provide rationale, examples, and proposed reasons for observing shifts in weed communities in response to changing tillage practices, choices of weed management practices, and in glyphosate-tolerant soybean cropping systems.