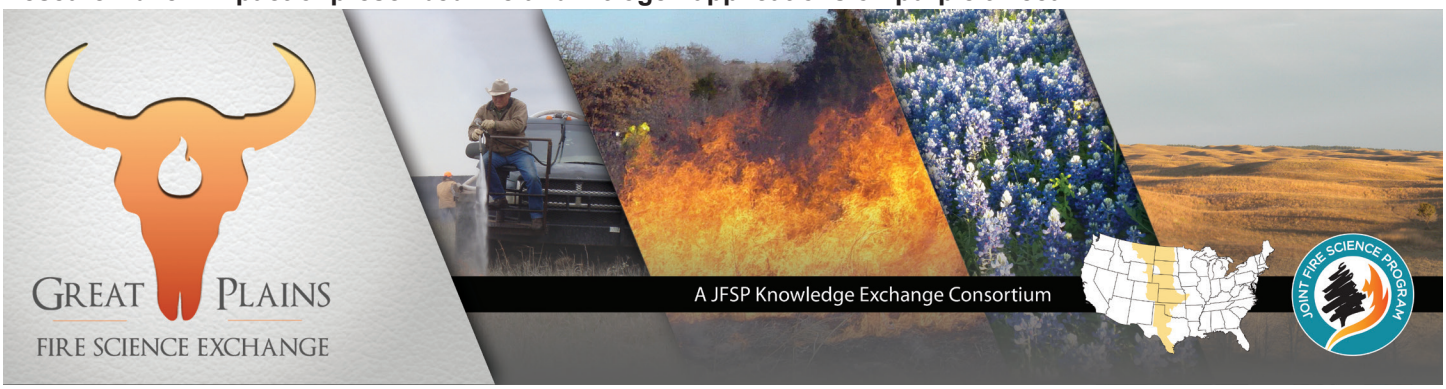

GPE publication 2017-2

Impact of prescribed fire and nitrogen applications on purple threeawn

Written by: Lance Vermeire and Carol Baldwin

INTRODUCTION

Purple threeawn (*Aristada purpurea*) is a native perennial grass found throughout the western half of the United States. Purple threeawn reproduces from seed and vegetatively from basal buds, the source for new tillers. While typically a minor grassland species, it increases with intensive disturbance and can persist at high levels decades afterward. Livestock avoid purple threeawn because of its sharp awns, low forage quality, and high silica content. Purple threeawn is typically considered a weedy species in need of management once it transitions from sparse to common.

Fire is important to grasslands and affects grassland productivity, species composition, and nutrient cycling. Fire, grazing, and drought affect bud banks differently depending on the species. Nitrogen is often scarce in grasslands and is probably important for development of buds into tillers. The purpose of this study was to test how fire and nitrogen levels affect purple threeawn bud production, and to determine if levels of either factor would hold a key to reducing this plant when it increases weed.

LOCATION

This study was conducted on two sites in an eastern Montana semi-arid mixed grass prairie that had been tilled one time, seeded to crested wheatgrass, then abandoned for 80 years. These upland loam sites had also been moderately to heavily grazed for at least 40 years. Purple threeawn and non-native crested wheatgrass comprised 80-90% of the vegetation by weight. Other cool- and warm-season grasses were present, along with several annual and perennial forbs. Livestock were excluded from the site during the study.

TREATMENTS

Fire treatments included: no burn, summer fire, and fall fire. Nitrogen was applied at 0, 41, and 71 pounds/acre in the spring.

Figure 1. Purple threeawn.

RESULTS

Fall and summer fire without nitrogen applications reduced active purple threeawn buds by about 61-75%. Nitrogen applications without fire did not affect the number of threeawn buds. Following fire, however, nitrogen applications increased threeawn buds compared to burned plants without added nitrogen.

Both summer and fall fire reduced the number of plant tillers and the number of buds on each tiller. Fire interacted with nitrogen applications mitigating bud reduction after fire. Fire effects were greatest in wet post-fire conditions. Direct heat was likely the cause of bud mortality. Purple threeawn is a bunchgrass, with an elevated crown that increases the exposure of buds to the heat of the fire. Nitrogen additions increased the growth of other plant species, improving their competitive advantage to purple threeawn.

MANAGEMENT IMPLICATIONS

Purple threeawn tillering can be reduced by summer and fall prescribed fire in eastern Montana mixed grass prairie. Nitrogen applications alone or in combination with fire were not beneficial for reducing purple threeawn.

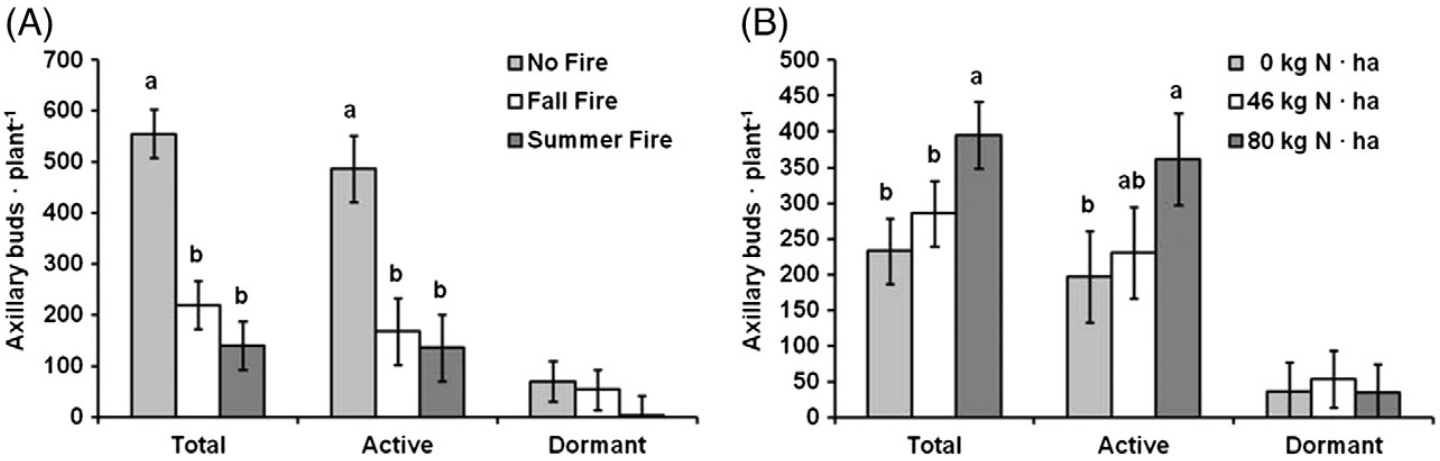

Figure 2. Total, active and dormant axillary buds per plant by fire treatment (A) and nitrogen addition treatment (B) and standard errors of the comparison .Means within a panel and bud class followed by the same letter are similar.

Original publication:
Russell, M.L. and L.T. Vermeire. 2015. Fire and nitrogen alter axillary bud number and activity in purple threeawn. Rangeland Ecology and Management 68:65-70.