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Peanut Check-OFF Funds – Final Report for 2016-17 Funding Cycle

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UNIT: Agronomy

TITLE: Germination profile of Spanish neelde (*Bidens alba*)

OBJECTIVES:
Determine when Spanish needle is most likely to germinate in peanut fields so we can design management programs to target small plants.

INTRODUCTION:
Spanish needle has been a common pasture and natural area weed for decades. However, in the past 4-5 years this weed has been observed to invade peanut production fields. The principle reason for invasion is likely the use of imazapic and the PPO herbicides (Ultra Blazer and Cobra). In research conducted to control Spanish needed on highway rights-of-ways, we have repeatedly shown that imazapic and saflufenacil (a PPO herbicide) are largely ineffective on this plant. By using imazapic and the PPO herbicides to control a wide variety of common peanut weeds, we have inadvertently released Spanish needle to grow and reproduce at peak capacity.

Recent attempts to conduct field trials on this weed were unsuccessful since this plant appears to germinate and emerge over a long period of time. Additionally, the field site was moldboard plowed prior to the experiment and the Spanish needle stand was inconsistent due to the uneven burial of the seed. In order to get an understanding of germination and emergence profiles, we began with a greenhouse experiment to test germination and emergence.

METHODS:
Seeds were harvested from multiple natural populations. These seeds were cleaned and combined. Twenty seeds were then placed in petri dishes with moist paper towels and incubated at temperatures ranging from 10-30C. After 14 days, all live and germinated seed were counted. If the radical emerged from the seed, it was considered to have germinated. This experiment was also perform in light and darkness to determine if light is essential for the germination process.

Depth of emergence was tested using cone-tainers filled with a combination of 50% sand and 50% commericial potting mix. Seeds were placed at multiple depths to

determine if Spanish needle prefers to surface germinate or it emergence from depth is possible. The cone-tainers were watered to field capacity and placed in a growth chamber at 25C for 14 days. Emergence was recorded if the cotyledons were observed.

RESULTS AND CONCLUSIONS:
Spanish needle germination was responsive to temperature, although germination did occur at all temperatures tested (Figure 1). No differences were detected between light and dark incubation, so data were pooled. At 10 and 15C, germination was 30 and 42%, respectively. As temperature increased to 20C, germination increased dramatically to 81%. The ideal temperature appears to be 25C with >90% germination, however, no statistical differences were detected between 20 and 30C. These data indicate that Spanish needle is capable of germinating over a rather wide temperature range. Field observations indicate that Spanish needle arrives in peanut fields later in the season. However, these data incidate that the plant germinates and establishes rather early, but is likely overlooked by scouting operations.

Surprisingly, Spanish needle was observed to germinate at all depth (Figure 2). Emergence was greatest at the 1 and 2 cm depths with 91 and 79%, respectively. Burial at 4cm showed a significant decrease in emergence with 41% being observed. Although emergence at the 6cm depth was unexpected, only 10% of the seeds were observed.

These data indicate that Spanish needle prefers to germinate in rather warm soils at a shallow depth. Knowing this can impact management strategy. Although few herbicides have been found to be effective, it is possible that cultural practices can be used to assist where this weed is present. In highly infested fields, it would be helpful to moldboard plow the field in the fall, after peanut harvest. This will bury the Spanish needle seeds lower than 6cm, which will likely have a significant impact on emergence. Additionally, planting a fall covercrop and then planting into that cover could also be beneficial. Covercrops have been shown to decrease soil temperatures by allowing more water retention and blocking direct sunlight. This decreased temperature can be useful since soil temperature below 20C significant reduces germination.

Figure 1. Percent Spanish needle germination relative to incubation temperature. Error bars represent 95% confidence intervals.

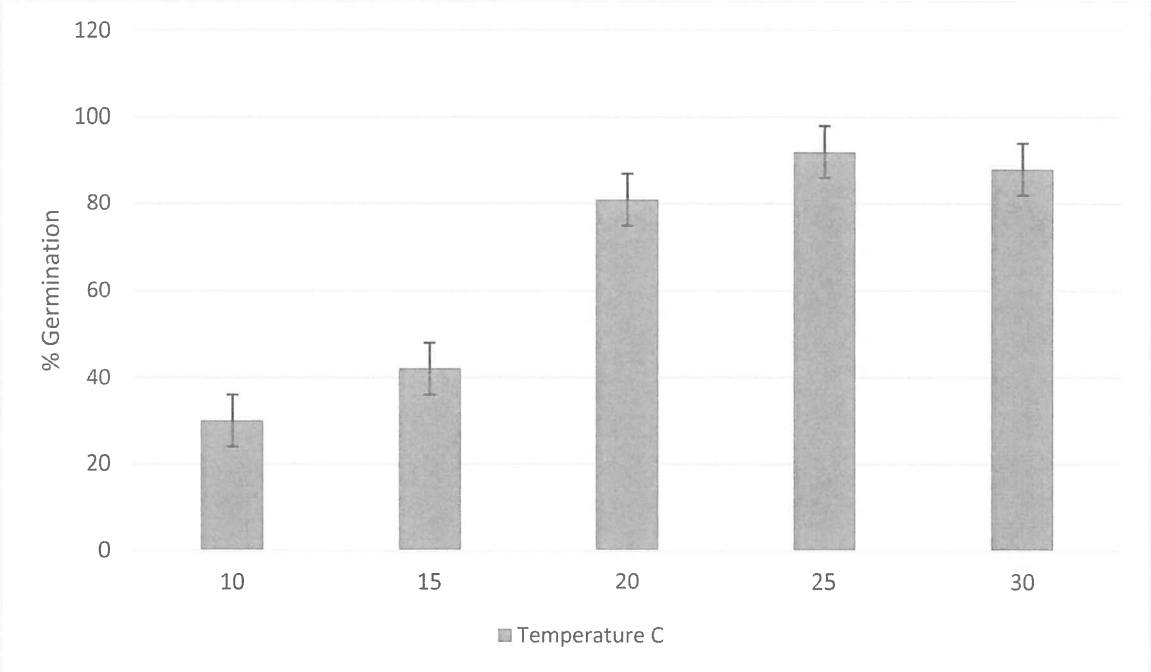

Figure 2. Spanish needle emergence when buried at various depths. Error bars represent 95% confidence intervals.