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Combinations of Corn Gluten Meal, Clove Oil, and Sweep Cultivation are Ineffective for Weed Control in Organic Peanut Production

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Weed control in organic peanut is difficult and lack of residual weed control complicates weed management efforts. Weed management systems using corn gluten meal in combination with clove oil and sweep cultivation were evaluated in a series of irrigated field trials. Corn gluten meal applied in a 30 cm band over the row at PRE, sequentially at PRE+2 wk after emergence, and PRE+2wk+4wk did not adequately control annual grasses and smallflower morningglory. Similarly, a banded application of clove oil applied POST did not adequately control weeds. The only treatment that improved overall weed control was sweep cultivation. Peanut yields were not measured in 2006 due to heavy baseline weed densities and overall poor weed control. Peanut yields were measured in 2007 and were not affected by any weed control treatment due to poor efficacy. While sweep cultivation improved weed control, weeds were controlled only in the row middles and surviving weeds in-row reduced peanut yield. Even when used in combination with sweep cultivation, corn gluten meal and clove oil were ineffective and offer little potential in a weed management system for organic peanut production.
Nomenclature: Clove oil; corn gluten meal; crowfootgrass, *Dactyloctenium aegyptium* (L.) Willd.; goosegrass, *Eleusine indica* (L.) Gaertn.; smallflower morningglory, *Jacquemontia tamnifolia* (L.) Griseb.; southern crabgrass, *Digitaria ciliaris* (Retz.) Koel.; Texas millet, *Urochloa texana* (Buckl.) R. Webster; peanut, *Arachis hypogaea* L.
Key words: Clove oil, corn gluten meal, cultivation, mechanical weed control, organic peanut production, organic weed control.

El control de malezas en maní orgánico es difícil, y la carencia de control residual complica aún más los esfuerzos para el manejo de malezas. Se evaluaron sistemas de manejo de malezas incluyendo harina de gluten de maíz en combinación con aceite de trébol y con cultivadores de barrido en una serie de ensayos de campo bajo riego. El gluten de maíz aplicado en una banda de 30 cm sobre la línea de siembra en PRE, secuencialmente a PRE+2 semanas (wk) después de la siembra, y PRE+2wk+4wk no controló adecuadamente malezas gramíneas anuales ni *Jacquemontia tamnifolia*. Similarmente, una aplicación en banda de aceite de trébol realizada POST no controló adecuadamente las malezas. El único tratamiento que mejoró en forma general el control de malezas fue el cultivo de barrido. Los rendimientos del maní no fueron medidos en 2006 debido a las altas densidades de malezas iniciales y al pobre control de malezas. Los rendimientos del maní se determinaron en 2007 y no fueron afectados por ninguno de los tratamientos de malezas debido a su baja eficacia. Mientras que el cultivo de barrido mejoró el control, las malezas fueron controladas solamente en las zonas centrales entre las líneas de siembra y las malezas que sobrevivieron sobre las líneas de siembra redujeron el rendimiento del maní. Inclusive al usarse en combinación con cultivo de barrido, el gluten de maíz y el aceite de trébol no fueron efectivos y ofrecen muy poco potencial de control en sistemas de manejo de malezas para la producción orgánica de maní.

There is interest in diversifying segments of peanut acreage in the southeastern United States to certified organic production to meet the consumer demand for organic peanut butter. Currently, the majority of the organic peanut production in the United States occurs in western Texas and eastern New Mexico (Guerena and Adam 2008). Peanut production in this region is at elevations > 1200 m and the growing season is short. As a result, organic peanut produced in that region is primarily Valencia peanut, which has a shorter growing season and lower yield potential, than runner-type peanut. Runner-type peanut is the primary component of peanut butter and is commonly grown the southeastern United States.

Research on weed management for organic peanut grown in the southeastern United States has focused on cultivation strategies, cultural practices that facilitate weed suppression by peanut, and herbicides derived from natural products (Johnson and Mullinix 2008; Johnson et al. 2012a, 2012b; Wann et al. 2011). Results from these studies clearly indicate the potential of mechanical weed control using cultivation with a tine weeder. Despite the effectiveness of frequent and intense cultivation with a tine weeder, in-row weed control remains problematic. Even with the best performing implements operated at the optimum times, some weeds in-row escape control and cause losses.

Herbicides derived from essential oils may be of value but are strictly contact herbicides and do not provide residual weed control (Bainard et al. 2006). Clove oil is an essential oil and herbicides containing clove oil are non-selective (Dayan et al. 2009) but generally more effective on dicot weeds than monocots (Boyd and Brennan 2006; Evans and Bellinder 2009). Weed species, size, and foliar architecture have been identified as factors that influence clove oil efficacy on dicot weeds (Evans et al. 2009). In contrast, annual and perennial monocots are not consistently controlled by clove oil (Johnson and Mullinix 2008; Smith et al. 2011). Due to extreme cost,

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