Management Effects on Yield in Organically Grown American Skullcap (*Scutellaria lateriflora*)

Santosh Shiwakoti[1], D.A.Shannon[1], C. W.Wood[1], N. Joshee[2], K. Lawrence[3]

[1] Department of Agronomy and Soils, Auburn University, Auburn, AL
[2] Agriculture Research Station, Fort Valley State University, GA
[3] Department of Entomology and Plant Pathology, Auburn University, Auburn, AL

INTRODUCTION

Skullcap (*Scutellaria spp.*) is a member of the mint family (Labiatae or Lamiaceae).The genus Scutellaria includes 300 species (Joshee et al. 2002). *Scutellaria lateriflora* is the most commonly grown and marketed species (Wills and Stuart 2004). *S .lateriflora* is indigenous to North America growing in wet places from Canada to Florida and westward to British Columbia, Oregon and New Mexico (Bergeron et al. 2005).Also known as American Skullcap, Virginia Skullcap, Mad Dog Skullcap or Blue Skullcap.). *S. lateriflora* is a perennial plant that grows about 0.5 meter high with blue colored flower and helmet shaped fruit (Bergeron et al. 2005). Flavonoids, volatile oils, iridoids, diterpenoids, waxes and tannins are the chemical constituents found in Scutellaria genus (Wren 1998) which makes them pharmacologically important. Skullcaps have been used as a sedative, nervine, antispasmodic and anticonvulsant (Millspaugh 1974). The aqueous extract of the flowering parts of *S.lateriflora* has been traditionally used by Native Americans as a nerve tonic and for its sedative and diuretic properties (Burlage 1968). Similien (2009) demonstrated that American Skullcap can be successfully grown in Alabama. Highest yields were obtained with partial shade, irrigation and fertilization. Research on optimum timing and frequency of harvest of American Skullcap for yield is lacking.

OBJECTIVES

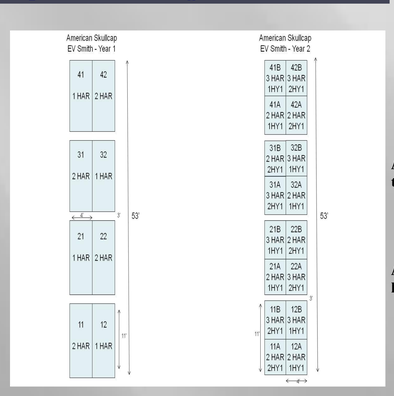
The objectives of this study are to:

➢To determine whether the frequency of harvest has positive /negative effect on total yield

➢To determine how many times plant should be harvested in a season.

METHODS

Experimental Design and Treatments:



Average air temperature: 22.62 C

Average relative humidity: 66.1

Experiment Station: E.V.Smith Research Center,Shorter,AL

Soil type: Marvyn loamy sand (fine-loamy, kaolinitic, Thermic Typic Kanhapludults) with 0-2% slope

Year 1:

➢Treatments: 1 harvest/season and 2 harvests/season

➢Design: Randomized complete bock with four replications.

Year 2:

➢Treatments: 2 harvests /season and 3 harvests/season

➢Design: 2x2 Split plot in a RCB.

➢Main Factors: Number of harvests in first season (2008): one harvest per season and two harvest per season.

➢Sub Factors: Number of harvests in second season (2009) : two harvests per season and three harvests per season.

HARVESTS & MANAGEMENT

First year harvest table (2008)

Treatment	Date of harvest	Growth stage
2 har/season	07/03/2008	Prime bloom
1 har/season	07/16/2008	Post bloom and early seed set
2 har/season	10/03/2008	Post bloom

Second year harvest table (2009)

Treatment	Date of harvest	Growth stage
3 har/season	06/12/2009	Prime bloom
2 har/season	07/08/2009	Late bloom and early seed set
3 har/season	08/06/2009	Prime bloom
2 har/season	09/11/2009	Growing stage(vegetative)

➢Weed control was done manually and Trilogy (neem oil fungicide) was sprayed for powdery mildew

➢All the harvestings were done above ground stems and leaves with pruning sheer.

➢3rd harvest in second season was not possible due to high mortality due to *Pythium* (see Photo 6).

RESULTS (Photos)

Photo 1: Active vegetative Growth Stage(2009)

Photo 2 : Post Bloom and Early Seed Set Stage(2009)

Photo 3 : Shade Structure to Protect the Plants from extreme heat (2009)

Photo 4: Powdery Mildew Infestation (2009)

Photo 5: Severely Infected with Powdery Mildew and *Pythium* (2009)

Photo 6 :Loss of Plant Stand Due to Powdery Mildew and *Pythium* (2009)

Results (graph)

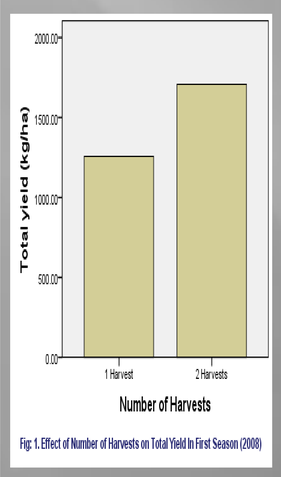


Fig: 1. Effect of Number of Harvests on Total Yield In First Season (2008)

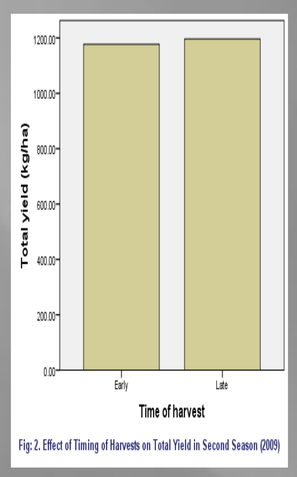


Fig: 2. Effect of Timing of Harvests on Total Yield in Second Season (2009)

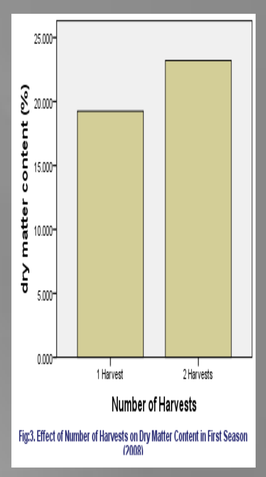


Fig:3. Effect of Number of Harvests on Dry Matter Content in First Season (2008)

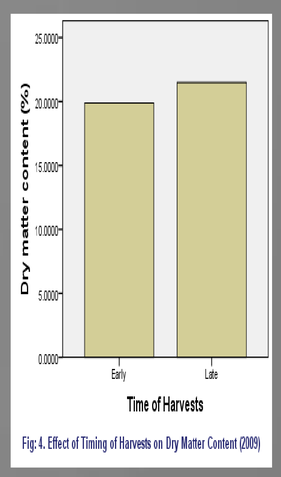


Fig: 4. Effect of Timing of Harvests on Dry Matter Content (2009)

RESULTS (graphs)

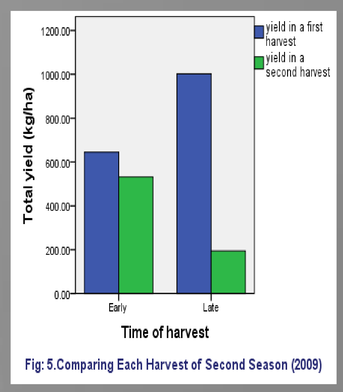


Fig: 5.Comparing Each Harvest of Second Season (2009)

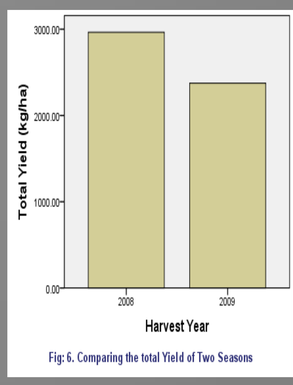


Fig: 6. Comparing the total Yield of Two Seasons

RESULTS:

➢In 2009, third harvest in second season (2009) was not possible because of die-off.

➢Yield of 2 harvests per season was significantly higher than 1 harvest per season (Fig:1).

➢ Percent dry matter in season 1 was significantly higher with 2 harvests per season than in 1 harvest per season (Fig: 3)

➢In second year, no significant differences were observed for total yield and dry matter content (Fig:2 andFig:4).

➢First harvests of both treatments were much higher than the second harvests of both treatments in second season (Fig:5).

➢Powdery mildew (*Erysiphe*), root rot due to *Pythium* and Cucumber Mosaic Virus (CMV) were identified in the plots. CMV was localized in border plots (see photo 5 and 6)

DISCUSSION

➢Two harvests may be made in the first and second years of production. A third harvest might have been possible in second season in absence of *Pythium* infection

➢Plant die-off due to *Pythium* infection may be attributed to unusually high summer rainfall

➢ Powdery mildew is common, especially under shade (Similien, 2009) but is easily controlled with foliar sprays

CONCLUSIONS

American Skullcap can be grown successfully in Southeast. At least two harvests per season may be attained if the rainfall is adequate and diseases are controlled. The experiment should be repeated to know the effect of three harvests per year in second year.

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