

Growth & Yield of Six Medicinal Herbs in Response to Mulch Type



A project of:



&
The N.C. Consortium on Natural Medicines

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INTRODUCTION

Weeds are a major concern in the production of many medicinal herbs. Weeds can interfere with the growth of the herb, reducing yields of foliage, flowers, and roots. The presence of weeds in the harvested herb can lessen the value of the herb or render it unmarketable. Weed control on medicinal herbs is difficult because there are few herbicides cleared for use, and many herbs are organically grown. In this study, we examined the use of white and black plastic mulches to control weeds in the production of six medicinal herbs in the northern piedmont region of North Carolina.

MATERIALS & METHODS

Arnica (*Arnica chamissonis*), *Echinacea purpurea*, *Echinacea angustifolia*, motherwort (*Leonurus cardiaca*), spilanthes (*Spilanthes oleracea*) and skullcap (*Scutellaria lateriflora*) were seeded in flats in a greenhouse in April 2002 to produce transplants for field setting in May and June. The study was located on the Upper Piedmont Research Station near Reidsville, North Carolina. The herbs were grown for two years on raised beds with drip-irrigation. The beds were left bare or covered with black plastic mulch or white plastic mulch (Figures 1 & 2). The experimental design was a split plot with mulch treatments as the main plots and individual herbs as the sub-plots. There were four replications. Each sub-plot was three meters long on 1.5 meter centers. Each sub-plot contained staggered rows of a total of 20 plants. Data were collected on vigor, color, winter survival, disease, flowering, and weed growth. Depending on the particular herb, foliage and flowers were harvested during both growing seasons and roots were harvested at the end of the second season. Harvested material was weighed, dried in a forced air drier at 35°C, and reweighed.

RESULTS & DISCUSSION

Both plastic mulches provided excellent weed control compared to the bare-ground treatment (Fig. 3). Arnica flower yields were reduced when plants were grown with either plastic mulch. Total season dry weight yields of *E. angustifolia*, motherwort, skullcap, spilanthes tops, and *E. purpurea* tops were unaffected by any mulch treatment. Dry weight root yields, however, of *E. purpurea* and spilanthes were highest in the bareground treatment.



Figure 1: Mulch Treatments



Figure 2: Herb Sub-plots



Figure 3: Weed growth in spilanthes grown on bareground (A), black plastic (B), and white plastic (C)

Table 1: Second Year - Total Season Yields (kg dry weight • 100 m row⁻¹)

Mulch Treatment	Arnica		<i>E. purpurea</i>		<i>E. angustifolia</i>		Motherwort		Spilanthes		Skullcap
	Flowers		Tops	Roots	Tops	Roots	Tops	Tops	Roots	Tops	
Bareground	7.78		67.25	22.38	4.09	0.73	55.36	24.21	3.13	13.88	
Black plastic	4.46		79.11	19.41	6.79	1.47	52.09	12.34	0.86	13.60	
White plastic	4.97		54.68	14.23	3.10	0.51	49.69	17.00	1.22	13.38	
F-Test	**		NS	**	NS	NS	NS	NS	*	NS	
LSD (0.05)	1.31		-	4.02	-	-	-	-	1.28	-	
LSD (0.01)	2.05		-	6.09	-	-	-	-	-	-	

NS, *, ** Nonsignificant, or significant at P ≤ 0.05 or 0.01, respectively.

Table 2: Second Year-Total Season Yields (kg fresh weight • 100 m row⁻¹)

Mulch Treatment	<i>Echinacea purpurea</i>			Arnica	
	Flowers	Tops	Roots	Flowers	Tops
Bareground	58.66	346.60	71.06	45.00	157.17
Black Plastic	87.42	369.33	63.99	24.75	57.56
White Plastic	67.22	254.87	49.48	27.71	58.17
F-test	**	*	*	**	**
LSD (0.05)	13.29	79.29	14.82	8.26	16.16
LSD (0.01)	20.14	-	-	12.95	25.33

*, ** significant at P ≤ 0.05 or 0.01, respectively.

CONCLUSION

Plastic mulch effectively controls weeds, but is only cost effective if crop yields are high enough to off-set the price of the mulch and its application. Although vegetable yields are usually increased with plastic mulch, arnica flower yields were dramatically reduced when grown with plastic mulch, probably making its use cost-prohibitive for most growers. For *E. purpurea*, yields with black plastic were the same or greater than those with bareground. Since for most growers the price of using plastic is less than other means of weed control, the use of plastic mulch to grow *E. purpurea* would probably be cost effective. There was no mulch effect on yields of *E. angustifolia*, motherwort, skullcap, or spilanthes tops. A grower would have to carefully consider weed pressures, labor costs, and the expense of using plastic in making the decision to use plastic mulch when growing these herbs.