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Effect of different mulch materials on seedling establishment of *Cleistogenes songorica*

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Key words: *Cleistogenes songorica*, mulch, soil temperature, soil moisture, seedling establishment

Introduction Surface-applied mulches are beneficial to seedling establishment and development through improving status of water, nutrient and heat energy of soil. This study aimed to compare the effect of different mulch materials on seedling establishment of *Cleistogenes songorica*, a dominant grass species collected from desert grassland of Inner Mongolia of China.

Materials and methods The experiment was conducted from June to August 2006 in Hexi corridor of Gansu province, China. Four treatments were used including mulching with: 1 cm soil (control), straw by 1kg/m², white clear plastic film of 0.6 mm thick, and 1 cm sand. The treatments were arranged with a randomized complete block design with four replicates. The plot (each treatment) was 1 m long and 1 m wide with 0.5 m apart. There were 8 rows in each plot and 400 seeds sown in each row. The plots were covered with designed mulches directly after sowing. Irrigation was applied with 70 kg water each plot in every 15 days starting from the first day after sowing. Establishment rate and shoot biomass after 60 days of sowing were measured. Soil moisture was recorded at 18:00 and soil temperatures recorded at 8:00, 14:00 and 20:00 daily in the experimental period.

Results and discussions The highest seedling establishment rate (40.7%) and shoot biomass (0.59g/plant) were obtained from mulching with sand (Figure 1 and 2). Compared with control, this treatment increased establishment by 18.5% and shoot biomass by 168.0%. The soil moisture at this treatment was 15.7% on average (2.2%-33.3%) and soil temperature varied from 16.7 to 36.9 °C (Table 1). These soil environments fitted to the ranges of optimum germination temperature (Yu *et al.*, 2004) and seedling establishment soil moisture (Tai *et al.*, unpublished data) for *Cleistogenes songorica*. The effect of straw mulching was significantly poorer than that of film for establishment which could be resulted by the lower soil temperature in this treatment. Similar result also reported for summer groundnut (Ghosh *et al.* 2006).

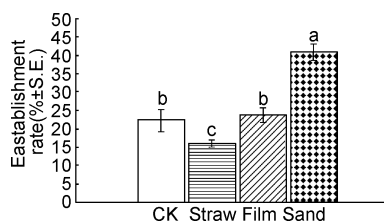


Figure 1 Effect of different mulch materials on establishment rate 60 days after sowing for *Cleistogenes songorica*.

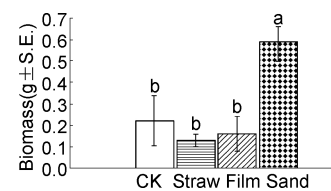


Figure 2 Effect of different mulch materials on shoot dry weight 60 days after sowing for *Cleistogenes songorica*.

Table 1 Effect of different mulching on moisture and temperature of 10 cm soil depth during 60 days after sowing.

Mulches	Soil moisture (%)			Mean soil temperature (°C)		
	Mean	Max	Min	8:00	14:00	20:00
Soil	10.8	35.7	1.3	14.7	31.9	22.1
Straw	21.1	37.3	2.0	14.5	24.0	20.6
Film	22.9	35.0	6.0	19.1	40.9	32.6
Sand	15.7	33.3	2.2	16.7	36.9	25.8

Conclusion Sand was the best mulch, compared to soil, straw and plastic film, for improving seedling establishment and growth of *C. songorica*.

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