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21st International Grassland Congress / 8th  
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The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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## Study on the water use of Chicory in Beijing of China

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**Introduction** Chicory (*Cichorium intybus* L.), a succulent forage needed for the developing cow industry (Dong, 2001), was introduced to Beijing. However, the deficient water resource is a key limiting factor for sustainable development of forage in Beijing. Water use of chicory needs to be studied further before it can be fully utilized in Beijing.

**Materials and methods** The experimental site, with a mean temperature of 12.2 °C and average annual precipitation of 518.3 mm, was located in Shunyi County in the northeast of Beijing. Chicory was planted in spring with a seeding rate of 12 kg/hm<sup>2</sup>. The plot area with 3 replications was 5m 10m each, and the space between plots was 2 m. Buffer areas were covered by plastic film to prevent water infiltration. Three different irrigation treatments of 60 mm (CK, 600 m<sup>3</sup>/hm<sup>2</sup>), 40 mm (MS), and 20 mm (SS) were applied for regrowth after 4 and 5 mowing were applied in 2002 and in 2003, respectively. The yield of chicory and the soil water content of each 10 cm (0~160 cm) were determined. Water content was determined using a 503DR9 Neutron Probe (CPN Co., Ltd., USA) every 15 d. The water use of crops (ET<sub>c</sub>) is calculated by the equation: ET<sub>c</sub>=I + P + ΔW; where P is the precipitation; I is the amount of irrigation; ΔW is the change of water shortage in the solum; all units are in mm (Yang and Shi, 1997). The water use efficiency is calculated by equation: WUE=Y/ET, where Y is the economic yield (Shan, 1994).

**Results** The irrigation of 20 mm produced a yield of 19039kg DM/hm<sup>2</sup> in 2002 and 22278.9kg DM/hm<sup>2</sup> in 2003, and 60 mm produced a yield of 22508.9 kg DM/hm<sup>2</sup> in 2002 and 27552 kg DM/hm<sup>2</sup> in 2003. The results indicated a yield of 56.7~143.8 kg/hm<sup>2</sup> could be gained with a daily water consumption of 1.88~3.61 mm. A strong positive relationship existed between water use and irrigation over the entire growing period (R<sup>2</sup>=0.9689). The average water use at the second and third-harvests was 25.0%~29.8% more than that of the other harvests. A quadratic relationship existed between water use and yield for the entire growing period. Total water use ranged from 506.7 to 584.2 mm and the WUE from 37.6 to 39.1 kg/hm<sup>2</sup>·mm in 2002, and 517.9 to 643.8 mm and 42.8 to 45.9 kg/hm<sup>2</sup>·mm in 2003, respectively. In addition, WUE increased with an increase in harvest times, and the WUE was the highest with 39.1 kg/hm<sup>2</sup>·mm in 2002 and 45.9 kg/hm<sup>2</sup>·mm in 2003 with the MS treatment (Table 1). The results suggested that irrigation is required for growing chicory in Beijing.

**Table 1** The water utilization efficiency of chicory (kg/hm<sup>2</sup>·mm).

Years	Treatments	First-harvest	Second-harvest	Third-harvest	Fourth-harvest	Fifth-harvest	Total
2002	CK	33.56	37.91	38.63	44.4	-	38.53
	MS	32.15	38.84	41.24	44.34	-	39.12
	SS	30.22	35.15	40.02	45.04	-	37.57
2003	CK	37.32	41.41	42.48	48.94	45.97	42.80
	MS	37.83	45.57	47.43	51.13	49.32	45.86
	SS	36.24	42.57	43.86	48.04	46.66	43.02

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