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Theme 2. Grassland production and utilization
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Preliminary trial to establish artificial grassland in Tibet, China

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Introduction

Tibet Autonomous Region with an average altitude of more than 4,000 m above sea level, altogether cover an area of 1.22 million km^2, equivalent to one-eight of the total area of China. High mountains along with forests and rivers in Tibet consist of an important ecological barrier for protecting parts of inland ecosystems. Tibet is also one of the five major pastoral areas in China. The grassland in Tibet covers 0.83 million km^2, but the grass is sparse and low, and with low yield in this area. There are nearly 2.8 million people in this region, while the area of arable land is less than 2.533 thousand km^2. Nearly 40.5 million tons of hay are needed for about 45 million sheep units in Tibet (Yu *et al*., 2010), while the actual amount is less than 20 million tons (including 15 million tons per year from natural grassland, and 2～3 million tons per year from the straw of naked barley). It exacerbating the degradation of natural grassland for the contradiction between livestock and grass. Research shows that the most effective measure to maintain local economic growth, coordinated development of ecological security and curb the further degradation of the grassland in Tibet is by planting high yielding and high quality forage crops, changing the traditional way of free grazing and implementing captive feeding gradually.

Materials and Methods

The author participated in research and extension of cultivated artificial grassland in Tibet from 2005 to 2012. The preliminary results are as follow:

Results and Discussion

Variety selection: The forage species suitable for planting in most areas at altitude below 4000 m in Tibet are oat (*Avena sativa* L.), common vetch (*Vicia sativa* L.), alfalfa (*Medicago sativa* L.), Forage-type triticale (*Triticosecale Wittmack*), forage-type rape (*Brassica napus*), sainfoin (*Onobrychis viciaefolia* Scop.), *Elymus dahuricus* Turcz. and *Elymus sibiricus* L.; while above 4000 m areas they are oat, forage-type Triticale and *Elymus nutans* Turcz.

Sequential cropping: The total hay yield can be up to 12.42 $t \cdot ha^{-1}$ in the sequential cropping plot, and 43% higher than single cropped plot in the south central and other areas at altitude below 4000 m.

The effect of soil repression after sowing on productivity of forage crops: The evaporation of soil moisture in Tibet is numerous. The seedling emergence is often low due to insufficient soil compactness caused by the lack of rolling after sowing. With the "traditional plowing + roller compaction", seedling emergence rate of oats, forage-type triticale and naked barley improved 18%, 8%, 30%, respectively, resulting in seed saving 117 $kg \cdot ha^{-1}$, 46 $kg \cdot ha^{-1}$ and 244 $kg \cdot ha^{-1}$, respectively (Guo-Wen Cui *et al*., 2014).

Mixed cropping of oats and common vetch: The highest crude protein yield which was obtained from the mixture group (seeding rate of oat was 210 $kg \cdot ha^{-1}$ and common vetch was 75 $kg \cdot ha^{-1}$) was 1513.06 $kg \cdot ha^{-1}$. This was and 415%, 17% higher than that of single cropped oat and single cropped common vetch, respectively (Li Ji-kai, *et al*., 2011).

Seed production: In order to reduce the cost of seed transport, and accelerate the planting of artificial grassland, seed production of oat base has to be established in Tibet. This will accelerate the spread and planting of artificial grassland.

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