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Research and extension experiences on grassland protection and construction (GPC) techniques in China

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Key words : grassland protection and construction, technique, research, extension

Introduction Chinese government attached more importance to the research and extension of GPC techniques, and started a series of GPC projects in view of the grassland degradation in China from 1990's. Although these projects were effective, it's often disputable on whether the technology advancement of GPC can keep the grassland degradation within limits, and to what degree. The yellow shaded area is the key element to be discussed in subsequent sections.

Methods Four types of GPC related techniques, namely artificial grassland planting, natural grassland improvement, grassland utilization in Southern China, and grassland remote sensing and information, were reviewed. The main focus was on the technical progress on the researches in these techniques, in China, during the period 1996-2005. The current state of the extension activities around these techniques and the impact in selected counties was documented.

Results The progress of research on GPC techniques, during the period 1996-2005, is remarkable. A total of 14 alfalfa varieties, 11 forage maize varieties and 93 gramineae varieties were bred and registered. The best production area is the arid area of north western China. Researches on the pasture mixture of artificial grassland, seed coating, selection and utilization of rhizobia, and water saving irrigation have shown progress. Degraded grassland improvement and biological fencing techniques had significant impact. The systems of mowing, grazing, and grazing indoors were established according to water resources and raised livestock in various rangeland areas. Techniques of shrub grassland improvement in southern China and techniques in grassland remote sensing made new progresses.

For the yellow shaded area it will be good to include some quantitative information on the positive outcomes. One would want to know what really the progresses are, impact shown, and new progress made...this will bring more strength to the paper.

The technical achievements and intellectual properties of GPC developed rapidly 1996-2005, but can't meet the demand of GPC yet. That there were few technical achievements of GPC among the National Scientific and Technological Awards demonstrates the lower level of GPC techniques compared with other agricultural disciplines. Papers published in 9 major periodicals from 1996 to 2005 showed that 50.8% was about artificial grassland planting techniques and 25% was about natural grassland improvement techniques. Patents of GPC techniques, more than 77% is about artificial grassland, increased year by year during 1996-2005 and kept linear growth from 2001.

GPC techniques is extended by three parts, involving grassland workstations of four levels which are levels of ministry, province, prefecture and county, research institutions and colleges and grassland enterprises, in which local grassland workstations are the principal extension part. At present, there are 583 local grassland workstations and 8700 grassland technicians in 12 western provinces according to statistics data. The technique extension usually progressed along with ecological construction projects in the last decade, taking the ways such as herdsman participating, demonstrating, training, project-promoting and able person-leading. The technique extension progressed well based on survey in typical counties, but it is critical that the professional teams and funds are quite limited and cannot meet the demands of GPC. It is clear that there are different extension modes for various GPC techniques. The three most famous alfalfa varieties bred in China extended differently. Zhongmu No. 1 expended in provinces of Hebei, Shandong, Inner Mongolia, Beijing and Liaoning respectively. The extension of Gannong No. 3 was mainly in Gansu. Gongnong No. 1 extended area by area in northeast China. So the study on GPC techniques extension model should be strengthened to improve aspects of efficiency and benefit.

Conclusions It is crucial to improve research level and original innovating capability of GPC techniques for grassland ecology and regional development. It is urgent to speed up the building of extension system of GPC techniques, study and improve the modes of technique extension further. This part needs to be worked a bit, so as to bring clarity to the conclusion.

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