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Research Article

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Study on the ecological characteristics of Drepanostachyumludianense in Guizhou Karst area

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ABSTRACT

There is a series of adaptive feature of D. luodianense in population level. It has high shoot-emergence number, high mortality and low bamboo grown-up rate. The shortage of nutrition is the main reason for the high mortality. In the distribution of D. luodianense, the age structure of the population is growing, but it tends to be stable. There is a great relationship between the distribution pattern and the sampling scale. With the increase of research scale, the clonal distribution pattern changes from random to cluster-based type, and the clonal ramets distribution pattern is an enhanced cluster-based type. The population regulation of D. luodianense belongs to density dependence type, which is affected by clonal density and clonal ramets density. The environment capacity of D. luodianense is about 100/m^2.

Keywords: Drepanostachyumluodianense, cloning, modular, population

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INTRODUCTION

Drepanostachyunluodianense (Yi et R. S.Wang) Keng f.), which belongs to bamboo Bambusoideae genus Fusarium sequence, is the typical species in China. It belongs to the one-time perennial flowering and fruiting sympodial bamboo species. In its distribution, drepanostachyunluodianense also enjoys the name of Ma bamboo, rattan bamboo (GengBojie, 1996). Drepanostachyunluodianense distributes only in Luodian County in Guizhou Province, Pingtang County, Ziyun county and county towns karst mountain. It has been regarded as the species in danger by "China Species Red List" and "IUCN Red List". The lower part of drepanostachyunluodianense is straight, near to the center. And the hanging upper part is in creeping vine-like extension, beautiful in appearance and valuable is cultivation and appreciation. Often growing into small pieces at an altitude of 600 ~ 1000m on bare limestone Rock Hill, becoming the suitable species in karst.

The research paths as shown in fig.1

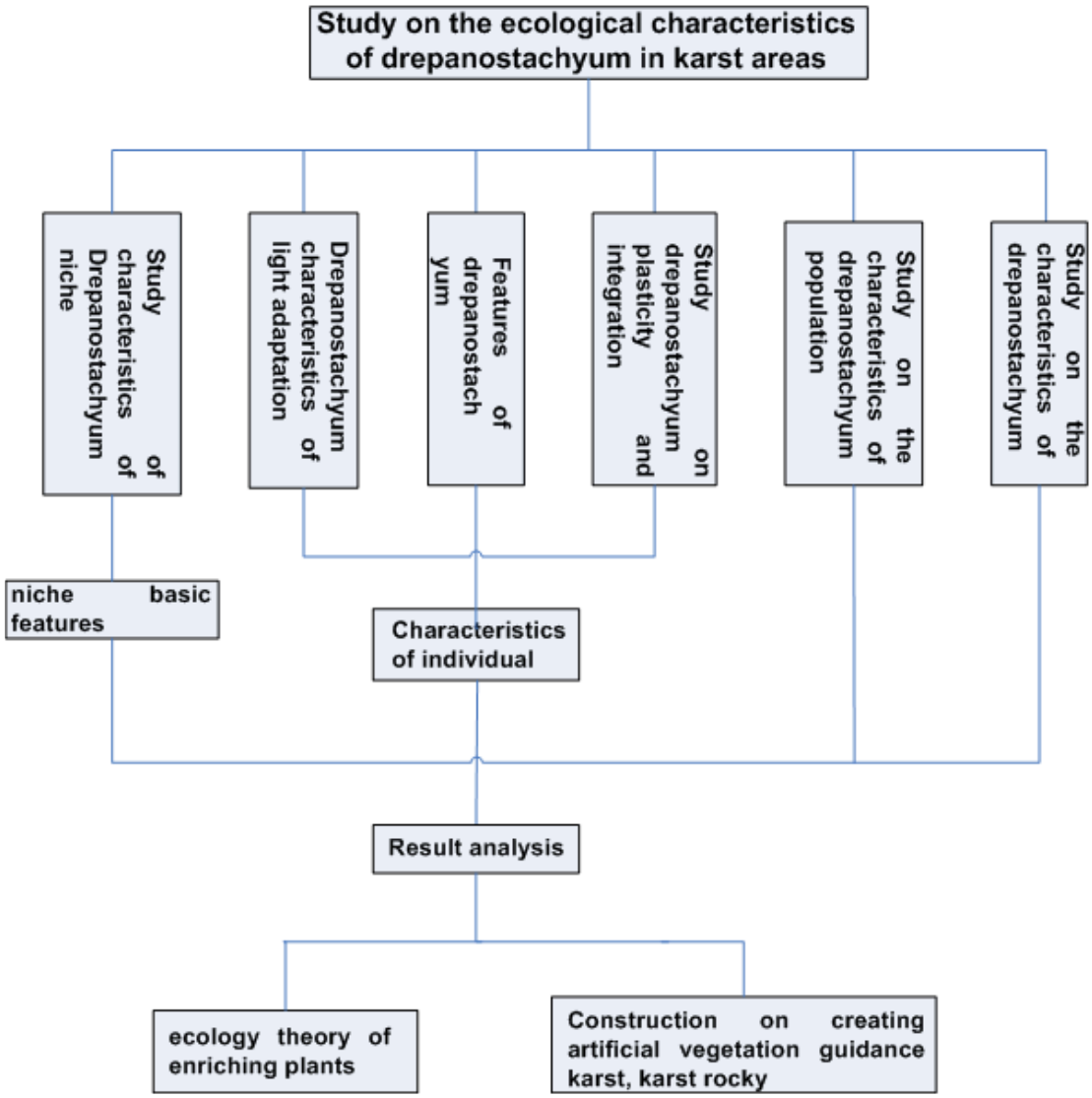

Fig 1 research path

THE RESEARCH STATUS AT HOME AND BROAD

Bamboo Ecological Research Status

Study on bamboo species ecology

Ecological study on bamboo species on community level

According to the research on species structure of ChangningNigatake bamboo and moso bamboo: Though the structure of Bitter bamboo population age managed by human or none-human operation is on the rise, the bitter bamboo species are simple under human operation(Yu Ying etc, 2500 species in total). The rate of aging and withering is high for moso bamboo forest and the age structure distributes in “J” type. However, the artificial age structure of moso bamboo is in normal distribution due to the human deforestation in the mature moso bamboo (He Dongjin, 2005). This indicates that the bamboos operated by human, in contrast with natural forest, is more dependant on human disturbance and the natural regeneration ability is weak. Besides, many authors have studied the bamboo species ecology from the perspective of species distribution pattern (Liu Qing, zhongzhangcheng, 1996; WangTaixin etc., 2005) Clone population life table (Liu Qinghe, zhongzhangcheng, 1997, Chen Yuhua and Song Dingquan, 2005) and the main species niche research etc.

Ecological study on bamboo species of individual level

Ecological study on bamboo clone species

Early plant ecology theory system which is based on scientific research rarely entangles with the clone growth

process. Therefore, certain theory is hard or unable to be applied in the ecological study on clone growth (Jackson et al.,1985;Tuomi & Vuorisala,1989 a,b;Wikberg,1995;Winkler & Fischer,1999).

A clonal plant, which belongs to different plant categories, is a pervasive species. Harper (1981) and White (1979) had illustrated the relevant definitions of clonal population which had been immediately accepted and applied in the multiple researches on plant population ecology (Ye Wanhui, 1994; Zhu Zhihong, 1994; Jones,1985;Maillette,1982;Noble,1979;Schmud. B,1990;Toom et al.,1989;Tuomi & Vuorisala,1989a;Eriksson & Jerling,1990;Dong Ming, 1996a,b;Vuorisalo et al.,1997). Clonal plants exist in almost all of the ecological types (Van Groenendael et al.,1990;Jackson et al.,1985),moreover, predominate in various ecological systems, such as grassland, tundra, wetlands and waters etc. Clonal plants play a vitally important role (Jonsdottir& Watson,1997;Lovett Doust,1987). 70 percent of the plant species of temperate forests cut down on the earth belong to clonal plants (Van Groenendael et al.,1990). In Northeast of China, the proportion of clonal plants in forest, crop area, meadow steppe, typical steppe and desert grassland ecosystem is respectively 48.4%,47.3%,42.3%,64.1%和66.5%(Song & Dong,2001); In China's water land, clonal plant consists of 66.79%, and important value is 69.55% (Song & Dong, 2002).

Clonal Growth is one of the main methods in clone realization, which refers to nutritional growth process of potential individuals under natural conditions (Mogie& Hutchings, 1990; De Kroon & Van Groenendael,1997). Clonal Growth is more favored in maintaining and influencing plants community, structure, function and stability in ecological system and the community species diversity (Oborny& Podani,1996;Stuefer et al.,2002).

The foraging behavior of clonal plants mainly discusses the policies to obtain necessary resources in the heterogeneity distribution environment for clonal plants (Dong Ming, 1996a, b). In contrast with non-clonal plants, clonal plants, especially Guerilla clonal plants, usually consist of a large portion (De Kroon et al.,1995;Dong Ming. 1996a, b;Hutchings et al.,1994). The study on clonal plants foraging behavior aims at understanding how plants overcome the difficulties brought about by the heterogeneity of resource distribution in the surrounding environment through phenotypic plasticity, thus further getting accumulation on clonal growth (De Kroon et al.,1995).

Cloning components plant has a hierarchical structure which is generally divided into a typical tertiary level: namely the base plant, fragments of cloning, points strains (Eriksson et al.,1990). Point seedlings fitness levels and related characteristics are affected by ramet system (fragments of cloning) traits (such as the position of plant in heterogeneous habitats) and the base plant level traits (such as the genetic control) (Dong,1995)

Traditional ecology is empirical science which is still dominated by field investigation and experimental method, but the theoretical analysis is also an indispensible method and the model analysis has been attached to more importance (Stiling,1994). The study on clonal plants mainly applies experimental method and the combination of model analysis and integrated comparison (Van Groenendael J et al.,1994; De Kroon H et al.,1995;Chen Shang,1999;Cain,1990;Zhang Shuminetc, 2000; Tao Jian, 2000; Caraco et al.,1991;Stuefer et al.,1994;Eriksson,1988);For the clonal population, such as shrubs, trees etc mainly applies the method of field investigation, but also takes advantage of model analysis and when necessary, experimental research is also feasible (Zhu Ning, 1994, M cGraw et al.,1990;Little et al.,1999;Liu Qing 1996a,b;Chen Xiaoyong, 1997;Ge Song, 1999; Brodie et al.,1995;Chang et al.,1998;Su Zhixian, 1994;;LiuQing, 1997).

The same clone base seedlings are often able to occupy a considerable space (Cook,1983;Wang,1999). Clone strains and potential cloning itself possess organic components (Bazzaz et al., 1977;Tuom,1989). At the same time, two conceptions exist in clonal plants species, namely the base plant species and Points of population. This is also a obvious characteristic which is different from none clonal plants (Yu & Dong,1999).

In the research of clonal plants, Ecological scholars abroad mainly choose herds as the researching objective. The study on bushes clone population is less and the research on trees plants is even countable (Jackson et al., 1985; Doust et al., 1988; Eriksson,1988;LiuQing, 1995; Chang,1998; Nantel, 1999; Eriksson, 1997. For the domestic ecology, domestic botany and relevant researchers, the study on herbs clone population is more. (Chen Shang, 1995; Zhu Zhihong, 1994; He Jinsheng, 1998; Chen Xiaoyong, 1997; Wang Yusheng, 1993; Yang Yunfei, 1995; 1998; Yu Feiyang, 1999). And the shrubs clone population is also the researching object (Zhu Ning, 1997; Ge Song etc, 1999; Li Genqianetc, 2001). The research group which is headed by Zhu Zhangcheng, has deep research on arborescent grasses- moso bamboo and bitter bamboo (Su Zhixianetc, 1994; Li Ruietc, 1997; Liu Qing etc, 1997). He Jinsheng has studied on the breeding process of branches of Fagusengleriana (He JInsheng, 1998). Chen Xiaoyong has studied cyclobalanopsis clone population diversity (Chen Xiaoyongetc, 1997). So far, the study on tree species clone population is still less, so it it the same with the research on gymnosperms clone population. (Hutchings et al.,1994;Huang Yuqing, 1998, Su Zongming, 2000).

Bamboo clone population growth

Bamboo clone population growth research: on one hand, expose the inner relationship between the development of bamboo clone through the analysis of development process and continuous measuring on each stage based on the research of bamboo shoots - young bamboo clone population. On the other hand, explore the structure dynamics by light of three hierarchies: bamboo clone population, points strains and artifacts. The study on bamboo clone population growth indicates that the individual amount of Sinocalamusaffinis (Su Zhixian etc., 1992), spot bitter bamboo (Liu Qing etc., 1997), facies distribution (Dong Wenyuan etc., 2002), Susan (Hu Chao, 2004), sand Luo Zhu (Yang Yuming, 1997), and location Fang Zhu (QiShanDing etc., 1997) is on cyclical growth. Sinocalamusaffinis is in 7 ~ 8 months, spot bitter bamboo for 6 ~ 8 months, facies distribution in 3 ~ 5, zizhu 4 ~ 5 month, sand Luo Zhu from April to September, location bamboo 9 ~ 11 months. The growth process of bamboo shoots - young bamboo height is consistent with Logistic equation. Circadian rhythm of sinocalamusaffinis, facies distribution, and the sand Luo Zhu clone population bamboo shoot - young bamboo culm growth is apparent. The pure growth of sinocalamusaffinis at night is more than that of a daytime. The growth of sand Luo Zhu at night is two times of that of daytime. Conversely, the Facies distribution, at daytime, is characterized by 1.5 times growth. There exists no obvious difference for the growth of spots Nigatake. The young bamboo diameter grows rapidly; Affinis completes within 15-20 days when the shoots unearth. spotNigatake is 20-30 days and 15 days only forQiongzhuea. The biomass structure of Affinis, spot Nigatake, Qiong bamboo, bamboo and bamboo cold cloning, biomass allocation of different ages and diameters, and vertical distribution and influencing factors of biomass component structure have all been studied. And a serial of biomass optimization model has been established. The corresponding results reflect the relationship of the characteristics of biomass component structure and the development stage, soil condition and silvicultural measures. The research on cloning biomass structure and dynamics indicates that biomass allocation proceeds in phases of each component Ramet of 1-2 years is stalk> whip> stump> roots> leaves> branches; Ramet of 3, 4 or five years, stalk> whip> stump> root> branch> leaf. The biomass of each component unit of clone population is Stalk> Whip> stump> roots> leaves> branches. Seasonal changes of photosynthetic biomass components are obvious. Population on the community level, aboveground biomass accounted for 55.06%, and underground 44.94%. In the stage of young bamboo, the dynamics of ramet biomass is consistent with the increase of Logistic. The research on the structure of the updated biomass of clonal population indicates that the order of biomass of each organ is: Culm> branch> root> Bamboo> rhizomatous and biomass of each age class was biased normal. The order of green bamboo according to age class is: 3 Age> 2 Age> 4 Age> 1 Age> 5 age. The order of biomass of different components at different age differs (Lin Yimingetc, 1998).

CONCLUSION

In the characteristics of clonal population, the thesis only has illustrated a small part of the content. In order to grasp the ecological dynamics of the biological and ecological characteristics, it is still a must to analyze the biomass and growth quality, earth condition, influence of ecological factors on the growth and development of Drepanostachyum, ecological strategy and morphological plasticity reaction etc from different facets, different years and different perspectives.

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