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Dynamics of reproductive allocation of reproductive tillers in *Stipa baicalensis* populations on the Songnen Plains , China

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Key words : *Stipa baicalensis* , reproductive tiller , biomass , reproductive allocation

Introduction Reproductive allocation (RA) is the biomass ratio of reproductive organs to total biomass in all assimilative resource of a plant individual . Individual is plastic in size due to the difference of the microenvironment . The plasticity follows certain rules and shows the regulation in growth and allocation at the population level . *Stipa baicalensis* , a perennial grass , is usually the constructive or companion species of communities in meadow steppe regions in China (Li , et al . , 2003) . The objective was to find the rules of the relationship of RA and height , biomass of tiller in different growing stages , which provided scientific accumulation to further research of reproductive ecology .

Materials and methods The study was conducted at the Pasture Ecology Research Station of Northeast Normal University , Changling , Jilin province of China (44° 45' N , 123° 31' E) which has temperate sub-humid continental monsoon climate . *S. baicalensis* experimental population was planted in 2005 . Each plot had an area of 2 m × 6 m with 5 replications . Forty reproductive tillers were sampled randomly in all plots at flowering and ripening stages , respectively . Height , tiller and inflorescence biomass were measured . The ratio of inflorescence biomass to tiller biomass was regarded as reproductive allocation . Relationships between biomass and height of the tiller , and RA and the height , the tiller biomass were evaluated using regression analysis .

Results The relationship between biomass and height of the tillers were positively linearly correlated ($p < 0.01$) at flowering and ripening stages , but between RA and both height and biomass of the tiller negative correlation was observed , and only at flowering stage between RA and height of the tiller the correlation was significant ($p < 0.05$) (Figure 1) . These indicated best isometric rule of the biomass and height of reproductive tillers . The rule of negative correlations on RA and height as well as biomass was gradually weakening from flowering to ripening stage . These showed RA of the tillers in different size were all tending to the average value of the population with growing stages .

Discussions The growth , intraspecies and interspecies competitions of plants shared in limited resource , and appropriate combination of growth and reproduction could form relative predominance in evolution . Taller tillers had good light and more nutrition , so they were advantageous in competition . Positive correlation of biomass and height indicated that increasing height was advantageous to the whole tiller , and an increasing ratio of vegetative growth would decrease RA . The nearly accordant RA in ripen embodied the strategies which *S. baicalensis* population advanced fitness through regulating growth and allocation .

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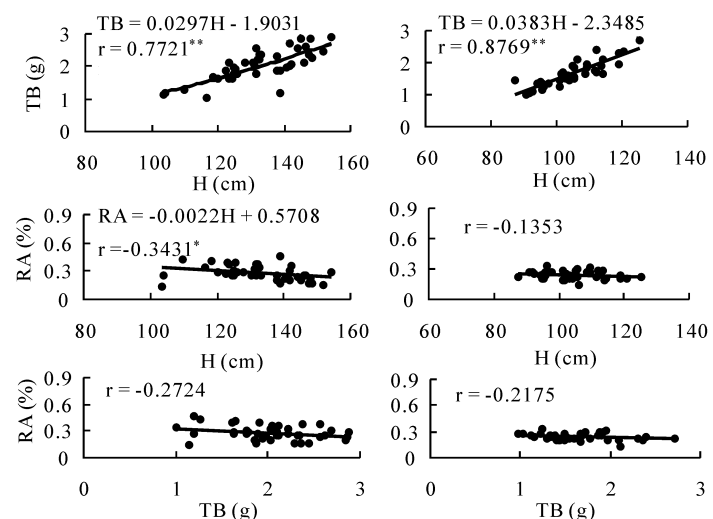


Figure 1 Observed data and simulated curves on relationship between total biomass (TB) and height(H) of the tiller , RA and both height and total biomass of the tiller at flowering (FS) and ripening (RS) stages .