Quantitative Classification of Subalpine Grassland under Degenerate Succession in Northwest Sichuan

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Introduction The northwestern Sichuan is located at eastern margin of Qinghai-Tibet Plateau , in which the vegetation is typical subalpine meadow . Two-way Indicator Species Analysis (TWINSPAN) , which was adopted to conduct the multi-analysis of the florae , was used to study the distribution patterns of subalpine grassland communities under degenerate succession in the region .

Materials and methods The pathway expedition on subalpine grassland in Hong-Yuan County was carried out for three years from 2005 to 2007 . The marsh , shade slope , flat and sunny slope were chosen to set up research sites . On base of those terrain , 45 sampling plots were investigated in non-degraded , lightly degraded , moderately degraded and severely degraded subalpine grassland . Using Importance Value as the measuring index , the 45×71 matrix was formed . Then through analyzing with the software PC-ORD , Two-way Ordered Table was obtained .

Results 45 sampling plots were divided into 13 groups by TWINSPAN . And in combination with the ecological characteristics , they were classified into 12 associations (Figure 1) : (Ⅰ) *Poa annua* + *Plantago asiatica* + *Thlaspi areven* , (Ⅱ) *Carum carvi* + *Elymus dahuricus* , (Ⅲ) *Carex alrofusca* + *Plantago asiatica* + *Ranunculus tanguticus* , (Ⅳ) *Kobresia pygmaea* + *Anemone rivularis* , (Ⅴ) *Kobresia setchwanenesis* + *Polygonum vivparum* + *Stellera chamaejasme* , (Ⅵ) *Kobresia setchwanenesis* + *Potentilla discolor* , (Ⅶ) *Kobresia setchwanenesis* + *Saussure japonica* + *Geranium pylzowianum* , (Ⅷ) *Festuca rubra* + *Aster alpinus* + *Deschampsia caespitosa* , (Ⅸ) *Elymus nutans* + *Deschampsia caespitosa* , (Ⅹ) *Carex muliensis* + *Kobresia setchwanenesis* , (Ⅺ) *Kobresia setchwanenesis* + *Carex muliensis* + *Sanguisorba parviflora* , (Ⅻ) *Caltha scaposa* + *Blysmus sinocompressus* + *Deschampsia caespitosa* .

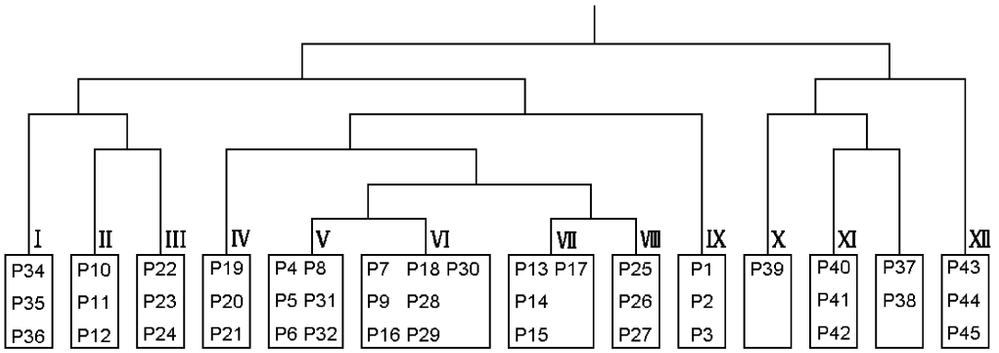

Figure 1 *Dendrogram of TWINSPAN classification .*

Conclusions The TWINSPAN results showed that distribution pattern of associations were mainly affected by the leading ecology factor of humidity and the gradient in degeneration of subalpine grassland . Community composition diverged distinct different groups between non-degraded and severely degraded subalpine grassland . While moderately degraded shade slope and lightly degraded sunny slope , or lightly degraded flat , shade slope and moderately degraded sunny slope had the similar composition characteristics of community .

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