



(RESEARCH ARTICLE)



Relationship between stems moisture to medical (*Senecio L.*) and elevation in *Shan County*

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Abstract

A key plant species (*Senecio L.*) not only is a vital multilevel functional medicinal material of indications of respiratory tract infections, tonsillitis, pharyngitis, pneumonia, conjunctivitis, enteritis, dysentery, but also it is a widely distributed wide plant species. This plant species is widely distributed elevation from 500m to 1500m in six landscapes in Shan County of China. However, understanding dynamics of stems moisture of the plants is difficult along elevation. Herein showed that relations between stems moisture of the species and elevation is a significant positive connection from 500m to 1000m ($P < 0.01$) as well as relationships between stems moisture of this species to elevation is a significant negative connection from 1000m to 1500m ($P < 0.01$). This study provides six types and eco-adaptation for finding new species. Therefore, this study has theoretical and practical significance for plants protection along elevation and environmental gradient over the spatial-temporal-environmental-disturbance scales (STEDS) in the multilevel green space diversity.

Keywords: Roots moisture; Elevation; Relationship; Eco-adaptation; Eco-functional value; Medicinal plant

1. Introduction

Stems moisture influences medical plants growth and sustainable evolution along elevation scale. Natural environmental and plantation factors often integrated effects of the human activities and acid rain on medicinal plant species by the research of process for deposition of thin films¹⁻³. But medicinal plant functional more traits may be finding through key physiological characters of antireflection coatings and ecological functional traits along elevation gradient⁴⁻⁷. Using plant leaf oxide films technological tools⁸⁻¹⁰, scientists explain that multilevel functional traits of medical species^{11, 12} and medical plant communities^{13, 14} by dynamic framework model¹⁵ for food chains¹⁶.

For instance, dynamics of community's height¹⁷, tree community's total trunk volume¹⁸, plant community's tree individual number¹⁹, plant individual specie's and plant communities' crown volume^{20, 21} of medicinal plant (*Sophora japonica*) along elevation. Although limits to local agricultural landscape area for protecting more natural landscapes²² (e.g., grasslands, wetlands, water and forests) or some half natural landscapes (e.g., green ecological urban and beautiful green countryside) areas for sustainable medical plant species, but dynamics of total dry biomass²³, total fresh biomass²⁴, vegetation coverage²⁵, plant average height²⁶, roots cuticle biomass²⁷, leaf -stalk biomass²⁸, stems cuticle biomass²⁹, species pair's co-dominance abundance dominance³⁰, Important Value³¹ and moisture content³² of (*Cremastra Appendiculata*) also deeply research.

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Therefore, it is a vital topic issues that the relationship between gene level and medical plant roots cuticle functional traits^{33,34}, as well as the dynamics of roots cuticle biomass³⁵, fresh roots biomass³⁶, stems cuticle biomass³⁷ associations with daily solar radiation for human cognitive³⁸ medical plant³⁹, especially, risk assessment and early warning mechanism (e.g, watersheds areas)^{40,41}. In short, herein explains relationship between stems moisture of the plant and elevation.

2. Typical environmental condition, situation of typical vegetation and methods of research

Study area is local in three typical zones: firstly, evergreen vegetation of north subtropical zone; secondly, evergreen and deciduous coniferous and broad-leaved mixed forest of north subtropical and warm temperate transition; thirdly, deciduous vegetation of warm temperate zone in Earth. Thus, this area is local in evergreen and deciduous coniferous and broad-leaved mixed forest in north subtropical and warm temperate transition in *Shan County* of China at STEDS (Figure 1).

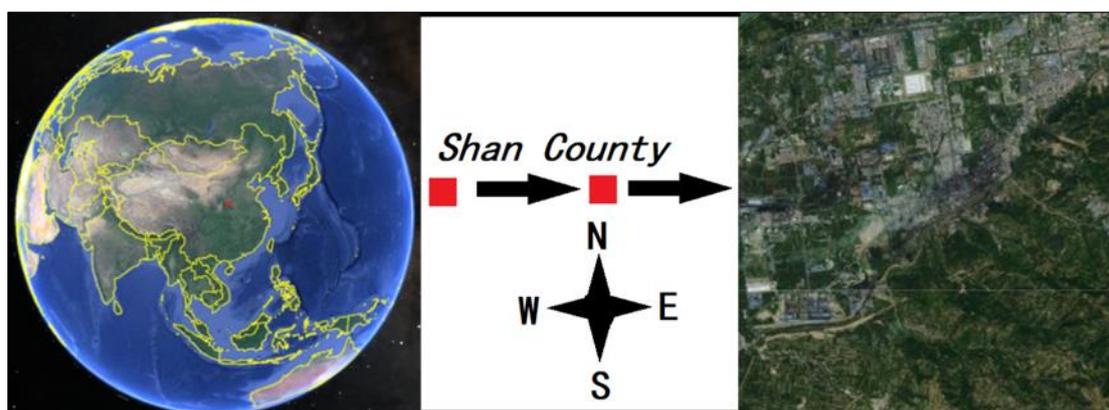


Figure 1 A Digital Cadaster Map of Typical Location in *Shan County* of China on Earth

There is a long-time investigation relationship of medicinal plant species moisture to elevation from 2005 to 2019. Investigation of “big data” included that stems moisture of medicinal plant species or other eco-index of medicinal plant species along elevation gradient over STEDS^{42, 43}.

Thus, there is the relation between stems moisture of (*Senecio L.*) and elevation, as well as there is a series of best six landscapes areas ecological adaptation of stems moisture of this plant species by the “big data” of ecological investigation, qualitative analysis, and quantitative statistics, human cognitive ecological linguistic rules, scientific theories and ecological planning methods.

3. Results and Analysis

Based on “big data” of plant investigation, this species is a widely distributed wide species along elevation from 500m to 1500m. A key species (*Senecio L.*) is a widely distributed along the different elevation from 500m to 1500m in *Shan County* of China. However, understanding the elevation effect on the relation between stems moisture of this plant species and elevation is very difficult, because elevation effect on plant root biomass⁴³, bryophyte and lichen biomass⁴⁴, wood biomass⁴⁵, mushroom biomass and diversity biomass⁴⁶, production of medicinal plant species⁴⁷.

Applying the dynamics of “big data” investigation, this work suggested there are five rules:

Firstly, herein showed that it is not only the increasing of (*Senecio L.*) stems moisture with the increasing of elevation from 500m to 1000m, as well as there are but also the decreasing of (*Senecio L.*) stems moisture with increasing of elevation from 1000m to 1500m (Figure 3).

Table 1 Stems Moisture of this Medical Plant Species Association with Elevation Gradient

Stems Moisture along Elevation	Stems Moisture of This Medical Plant Species
Elevation From 500 to 1000	0.855*
Elevation From 1000 to 1500	-0.978**
Stems Moisture along Elevation	Stems Moisture of This Medical Plant Species
Elevation From 500 to 1000	0.855*
Elevation From 1000 to 1500	-0.978**

Note: *, $P < 0.05$; **, $P < 0.01$.

Secondly, this study explained that there is a significant positive connection between (*Senecio L.*) stems moisture and elevation from 500m to 1000m ($P < 0.01$), as well as there is a significant negative connection between (*Senecio L.*) roots moisture and elevation from 1000m to 1500m in *Shan County of Henan Province of China* over STEDS ($P < 0.01$) (Table 1).

Thirdly, this research shows a good areas ecological adaptation of (*Senecio L.*) from 500m to 1500 in *Shan County of China*. Because there are results that there are not only different natural environmental factors, there are but also the dynamics of different elevation environmental factors from 500m to 1500m by the dynamics of stems moisture of this medical species (Figure 1, 2).

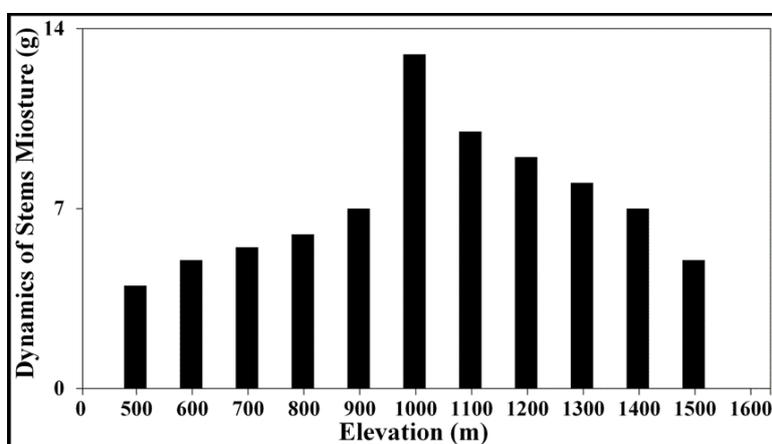


Figure 2 Dynamics of (*Senecio L.*) Stems Moisture along Elevation Gradient



Figure 3 Total Structures of Medical Plant Species (*Senecio L.*) by Long-time Investigation

Fourthly, this research proposed that the medicinal plant species (*Senecio L.*) is local in the six typical landscape types (forests, mixed between forests and grassland, mixed between forests and wetland, mixed between forests and river, mixed between forests and eco-urban, mixed between forests and countryside) by the “big data” of this plant stems moisture investing along elevation, because there may be results that there are not only dynamics of natural environments, there are but also dynamics of climate environmental factors from 500m to 1500m along elevation gradient.

Fifthly, the typical medical plant species (*Senecio L.*) not only is a vital functional medicinal material of indications of treating to respiratory tract infections, tonsillitis, pharyngitis, pneumonia, conjunctivitis, dysentery and enteritis, but also it is belonging to *Compositae* families of *Senecio* races of *Discotyledoneae* in *Angiospermae*, especially, total structures of (*Senecio L.*) (Figure 3).

Thus, this research found a series of typical areas ecological adaptation of plant (*Senecio L.*) of indication of treating respiratory tract infections, tonsillitis, pharyngitis, pneumonia, conjunctivitis, enteritis, dysentery along elevation gradient, as well as there is linking of the medical plant species (*Senecio L.*) stems moisture and elevation gradient in *Shan County of Henan Province* of China.

4. Discussion

The respiratory tract infections, tonsillitis, pharyngitis, pneumonia, conjunctivitis, dysentery and enteritis always influence public health, which often led human died. But understanding dynamics of medicinal plant species is very difficult issues, for instance, molecular dynamics⁴⁸, evolutionary dynamics⁴⁹ and indigenous medical plant⁵⁰. So, finding a vital multilevel functional medicinal plant (*Senecio L.*) of indications of respiratory tract infections, tonsillitis, pharyngitis, pneumonia, conjunctivitis, enteritis and dysentery not only is a key value plant species, but also treating many people's diseases or saving some individual human-lived. As such, it is a research that (*Senecio L.*) were found from 500m to 1500m in *Shan County of Henan Province* of China. And this research suggested three stems between (*Senecio L.*) roots moisture and elevation gradient at STEDS:

1. This work showed that it is an increasing of (*Senecio L.*) stems moisture with enhancing of elevation from 500m to 1000m; there be decreasing of (*Senecio L.*) stems moisture with increasing of elevation from 1000m to 1500m (Figure 2). There is a significant positive connection between (*Senecio L.*) stems moisture and elevation from 500m to 1000m ($P < 0.01$) as well as it is a significant negative connection between (*Senecio L.*) stems moisture and elevation from 1000m to 1500m along elevation gradient over STEDS in *Shan County* ($P < 0.01$) (Table 1).

2. This research provides six landscape types (forests, mixed landscape between forests and grassland, mixed landscape between forests and wetland, mixed landscape between forests and river, mixed landscape between forest and eco-urban, mixed landscape between forests and green beatified countryside), as well as there is a series of ecological adaptation of landscape areas (for instance, the best areas ecological adaptation of (*Senecio L.*) from 500m to 1500m) for finding this plant (*Senecio L.*) by the dynamics of (*Senecio L.*) roots moisture along elevation gradient.

3. (*Senecio L.*) not only is a vital multilevel functional medicinal material of indications of treating to respiratory tract infections, tonsillitis, pharyngitis, pneumonia, conjunctivitis, dysentery and enteritis, but also it is belonging to *Compositae* families of *Senecio* races of *Discotyledoneae* in *Angiospermae*, as well as it is widely distributed wide specie by the “big data” investigation of (*Smilax scobinicaulis*) stems moisture in *Shan County of Henan Province* of China (Figure 2, 3).

Indeed, better regional regulators and local government need better planning and regulation many medicinal plant species sustainability⁵¹ of ecosystems by researches on the key biomass of medicinal plants⁵² along elevation and environments with dynamics of plant diversity in the global, regional and landscapes natural ecosystem types with the ways “big data” investigation, scientific quantitative statistics⁵³ by landscape stability and sustainable medical plant diversity production⁵⁴. Therefore, government planner will protects habitats of this medical plant species (*Senecio L.*) by the lands eco-restoration^{55, 56} and integrated strategy technology⁵⁷ for avoiding plant species loss⁵⁸.

5. Conclusion

This research has a vital theoretical and practical significance for the reasonable protection of (*Senecio L.*) along elevation gradient, because this plant species not only is an important widely distributed wide medicinal material pant by treating infections, tonsillitis, pharyngitis, pneumonia, conjunctivitis, enteritis and dysentery, but also there are five

rules by linking (*Senecio L.*) stems moisture and elevation. Therefore, this study has vital theoretical and practical significance for multi-functional values and relation between the medicinal plants (*Senecio L.*) stems moisture and elevation along different environs, then, the planner needs integrated conservation priority areas.

Compliance with ethical standards

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