https://doi.org/10.46344/JBINO.2021.v10i06.02

LINKAGES BETWEEN LEAFSTALK BIOMASS OF MEDICINAL PLANT (*SMILAX SCOBINICAULIS*) AND ELEVATION

Bing-Hua Liao[1,2]

(1.*The Key Laboratory of Ecological Restoration in Hilly Areas, Forestry Department of Henan Province, Institute of chemistry and environmental engineering, Ping-ding-shan University, Ping-ding-shan City, 467000, China*; 2. *Institute of life and science, Henan University, Kai-feng City, He-nan Province, 475004, China*)

ABSTRACT

(*Smilax scobinicaulis*) of treating joint pain not only is a vital medicinal material plant, but also it is a widely distributed wide plant species. This plant species is widely distributed elevation from 500m to 3100m in forest landscapes and vegetation ecosystems in *Mei County* of China. However, understanding dynamics of biomass of leafstalk of this species is difficult along elevation. This research explained that the linkages between biomass of leafstalk of this species and elevation is a significant positive connection from 500m to 1500m (P<0.01) as well as the linkages between biomass of leafstalk of this species and elevation is a significant negative connection from 1500m to 3100m(P<0.01). This study provides six ecosystem types and a series of areas ecological adaptation for finding new medicinal species. Therefore, this research has vital theoretical and practical significance for medicinal plant protection along elevation and environments.

Key Words: biomass of leafstalk; elevation; connection; areas ecological adaptation; medicinal species.

INTRODUCTION

More and more Pharmacists is finding the correlation among biomass (average height, numbers, biodiversity, structure) of medicinal species and elevation from biomass (average height, numbers. biodiversity, structure) of the medicinal plant perspective (Table 1)[1-21], for better future of human health (ecosystems)[6-14]. However, medicinal species with typical history spanning over 1500 years, as well as areas ecological adaptation of a lot of fresh biomass weight of medical species are unknown, and cognitive ecological theory of the links between fresh biomass weight of medicinal species and elevation can be unknown along elevation and environmental gradient over years[12-21].

Thus, understanding these medical values of medicinal plant spices, as well as the links between of fresh biomass weight of medical species of different areas ecological adaptation and elevation is a vital rule along elevation at the spatial-temporal-environmental-disturbanc e scales (STEDS).

(*Smilax scobinicaulis*) not only is vital medicinal material of treating joint pain, but also is widely distributed wide specie in *Mei County* of China. The species is belonging to *Smilax L.* genus of Liliaceae families of Monocotyledoneae in Angiospermae. Understanding dynamics of biomass of leafstalk of this species is unknown, however. Indeed, our research not only explained that there are links between biomass of leafstalk of this species and elevation, but also explained that this species is a key medicinal plant species of treating joint pain by better future of human health, landscape functions, ecosystem services, space structures and ecosystem procession.

Therefore, there are rules that the links between biomass of leafstalk of (*Smilax scobinicaulis*) and elevation along elevation and environmental gradient in vegetation landscapes of *Mei County*.

Abbreviation: STEDS, the spatial-temporal-environmental-disturbance scales.

Table 1. Evaluation of links between of medicinal plant dynamics and environmental factors.

Assessments of links between multilevel medicinal plant and elevation	Authors
Links between biodiversity of plant functional groups and elevation at STEDS.	Liao, et al., 2010 [1].
Links between biomass of medicinal herbs and elevation in wetland landscape.	Liao, et al., 2011 a [2].
Links between plant functional groups diversity and elevation in forest.	Liao, et al., 2011 b [3].
Links between plant functional groups and elevation in near-natural forests.	Liao, et al., 2014 a [4].
Links between number of medicinal tree species and elevation in forestation.	Liao, et al., 2019 a [5].
Links between average height of medicinal tree and elevation in landscapes.	Liao, et al., 2019 b [6].
Links between medicinal tree trunk volume and elevation in forests.	Liao, et al., 2019 c [7].
Links between number of tree community crown volume and elevation.	Liao, et al., 2019 d [8].
Links between number of individual specie's crown volumes and elevation.	Liao, et al., 2019 e [9]

Links between plant diversity and different disturbance of different elevation.	Liao, 2014 b [10].
Links between dry weight biomass of biomedical plant and elevations.	Liao, 2020 a [11].
Links between total biomass of fresh weight of medical plant and elevations.	Liao, 2020 b [12].
Links between vegetation coverage of biomedical plant and elevation.	Liao, 2020 c [13].
Links between pair's co-dominance abundance dominancy and elevation.	Liao, 2020 d [14].
Relation between plant average height of biomedical plant and elevation.	Liao, 2020 e [15].
Links between biomass of biomedical plant roots cuticle and elevation.	Liao, 2020 f [16].
Links between biomass of medical plant roots cuticle and daily solar radiation.	Liao, 2020 g [17].
Links between leafstalk biomass of biomedical plant and elevation.	Liao, 2020 h [18].
Links between biomass of biomedical plant stems cuticle and elevation.	Liao, 2020 i [19].
Links between Important Values of biomedical plant species and elevations	Liao, 2020 j [20].
Links between moisture content of biomass of biomedical plant and elevation.	Liao, 2020 k [21].

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

Typical area is local in three 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, our research area is local in evergreen and deciduous coniferous and broad-leaved mixed forest in the north subtropical and warm temperate transition in *Mei County* of *Shan'xi Province* of China at the spatial-temporal-environmental-disturbance scales (STEDS) by 'big data' (Figure1).

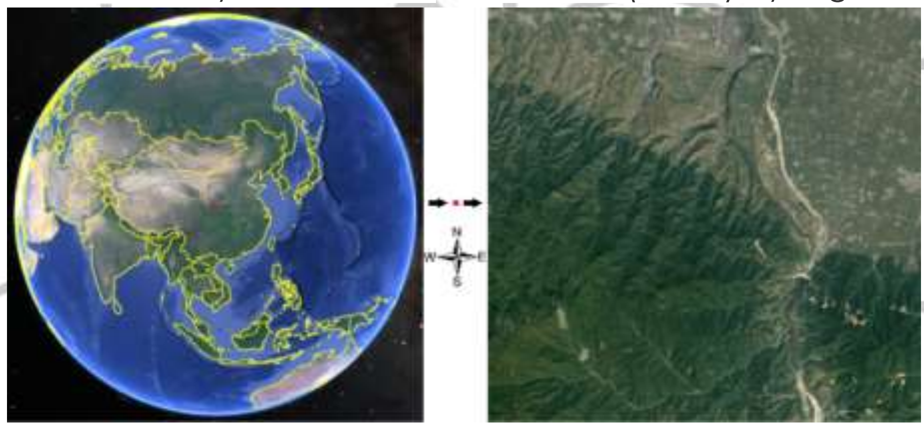

Figure 1. A Digital Cadaster Map and Research Methods of Typical Location in *Mei County* of China of Earth.

There are long-time investigation of correlations among leafstalk biomass of medicinal plant species and elevation from 2005 to 2020. Investigation of "big data" included that leafstalk biomass of medicinal plant species or other ecological index of medicinal plant species along different elevation and environmental gradient by previous our researches at STEDS [2-21].

Thus, there is the links between biomass of (*Smilax scobinicaulis*) leafstalk and elevation, as well as there is a series of (good, better, best) natural landscapes areas ecological adaptation of leafstalk biomass of this species by the "big data" of the ecological investigation, qualitative analysis, quantitative statistics, human cognitive ecological linguistic rules, theories, methods and ways along different elevation and environmental gradient in the multilevel research at STEDS[5-21].

Results and Analysis

Based on "big data" of plant investigation, this species is a widely distributed wide species along elevation from 500m to 3100m. (*Smilax scobinicaulis*) is a widely distributed along the different elevation from 500m to 3100m in *Mei County* of China. However, understanding the elevation effect on the links between biomass of leafstalk of this plant species and elevation is very difficult, because elevation effect on biomass of leafstalk of medicinal species[2-14, 18-26].

Using the dynamics of "big data" investigation, this research suggested there are four rules:

Firstly, this research suggested that there is not only the increasing of fresh biomass weight of (*Smilax scobinicaulis*) with increasing of elevation from 500m to 1500m, as well as there are but also decreasing of biomass of leafstalk of (*Smilax scobinicaulis*) with increasing of elevation from 1500m to 3100m at the STEDS in *Mei County* of China (Figure 2).

Table 2. Connection between Biomass of Leafstalk of this Species and Elevation

Elevation (m)	Elevation from 500m to 1500m	Elevation from 150m to 3100m
Biomass of Leafstalk	0.979**	-0.976**

Note: **, *P*<0.01.

Secondly, this study explained that there is the significant positive correlation between biomass of leafstalk of (*Smilax scobinicaulis*) and elevation from 500m to 1500m (*P*<0.01), as well as there is the significant negative correlation between biomass of leafstalk of (*Smilax scobinicaulis*) and elevation from 1500m to 3100m in *Mei County* (*P*<0.01)(Table 2).

Thirdly, this research provides a good areas ecological adaptation of (*Smilax scobinicaulis*) from 500m to 3100 in *Mei County* in China. Meanwhile, this research proposed that there is not only the better area ecological adaptation of (*Smilax scobinicaulis*) from 1000m to 2000m, there is but also the best areas ecological adaptation of (*Smilax scobinicaulis*) from 1300m to 1700m; because there are results that there are not only dynamics of different air environmental factors, there are but also dynamics of different soil environmental factors from 500m to 3100m by the dynamics of biomass of leafstalk of this species at STEDS in *Mei County* of China (Figure 2).

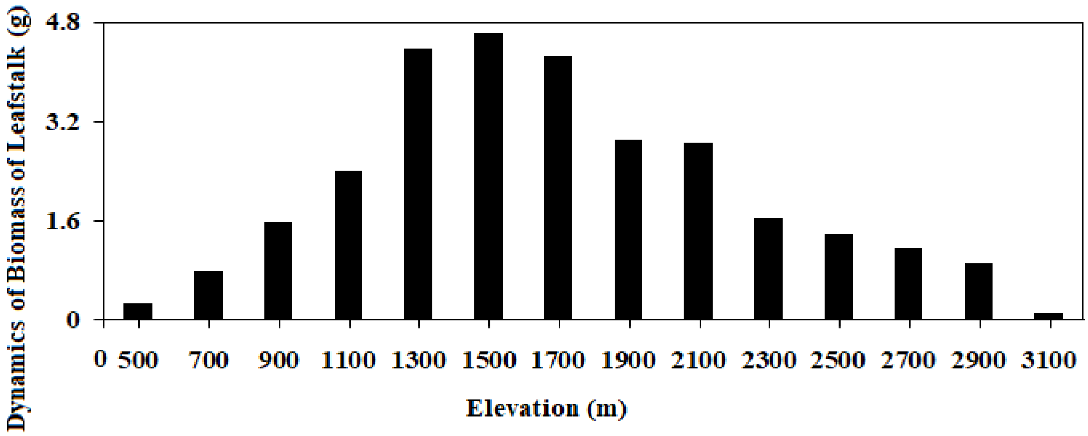

Figure 2. Dynamics of Biomass of Leafstalk of (*Smilax scobinicaulis*) along Elevation

Fourthly, this research proposed that medicinal plant species (*Smilax scobinicaulis*) is local in the six typical ecosystem types (forestation ecosystem, mixed ecosystem between forestation and grassland, mixed ecosystem between forestation and wetland, mixed ecosystem between forestation and river, mixed ecosystem between forest and urban, mixed ecosystem between forestation and rural settlement) by the "big data" of leafstalk biomass of medicinal plant species investing along elevation, because there may be results that there are not only dynamics of air environments, there are but also dynamics of soil environmental factors from 500m to 3100m along elevation and environmental gradient in multilevel study at STEDS in *Mei County* of China.

Thus, this research found a series of typical (good, better, best) areas ecological adaptation of (*Smilax scobinicaulis*) of treating joint pain along elevation gradient, as well as there is the links between leafstalk biomass of this medical species and elevation and environmental gradient.

Conclusion and Discussion

Explaining dynamics of medicinal plant species is very difficult[1-8, 27-31]. This work suggested three rules between leafstalk biomass of (*Smilax scobinicaulis*) and elevation:

1. Herein suggested that it is an increasing of biomass of leafstalk of (*Smilax scobinicaulis*) with increasing of elevation from 500m to 1500m, as well as there is decreasing of biomass of leafstalk of (*Smilax scobinicaulis*) with increasing of elevation from 1500m to 3100m (Figure 2). It is a significant positive correlation between biomass of leafstalk of (*Smilax scobinicaulis*) and differ elevation from 500m to 1500m ($P<0.01$); it is a significant negative correlation between biomass of leafstalk of (*Smilax scobinicaulis*) and elevation from 1500m to 3100m ($P<0.01$) (Table 2).

2. This work provides six vegetation types (forestation vegetation, mixed vegetation between forestation and grassland, mixed vegetation between forestation and wetland, mixed vegetation between forestation and river, mixed vegetation between forest and urban, mixed vegetation between forestation and rural settlement), as well as there is a series of areas ecological adaptation (a good areas ecological adaptation of (*Smilax scobinicaulis*) from 500m to 3100, the better area ecological adaptation of (*Smilax scobinicaulis*) from 1000m to 2000m, the best areas ecological adaptation of (*Smilax scobinicaulis*) from 1300m to 1700m) for finding (*Smilax scobinicaulis*) by

dynamics of biomass of leafstalk of (*Smilax scobinicaulis*) at STEDS.

3. This paper shows that (*Smilax scobinicaulis*) not only is a vital medicinal material of treating joint pain, but also it is belonging to *Smilax L.* genus of Liliaceae families of Monocotyledoneae in Angiospermae., as well as it is widely distributed wide specie by the "big data" investigation of biomass of leafstalk of (*Smilax scobinicaulis*)in *Mei County* of China.

Therefore, herein has a vital theoretical and practical significance for the reasonable protection of (*Smilax scobinicaulis*) along different elevation gradient in the different ecosystems, because this plant species not only is an important widely distributed wide medicinal material pant by treating joint pain, but also there are three rules by the links between biomass of leafstalk of (*Smilax scobinicaulis*) and elevation in *Mei County* of China. Indeed, better regional regulators and local government need better planning and regulation a lot of medicinal plant management eco-sustainability of ecosystems by the researches on biomass of leafstalk along elevation and environments with dynamics of biodiversity in the global, local, regional natural ecosystem types with the ways "big data" investigation, quantitative statistics, scientific analysis for better future of vegetation ecosystems and human well-being at the STEDS[32-43]. Next work this finding is a basal knowledge for the better understanding the interrelations between environmental factors and multilevel diversity (e.g., landscapes, population, communities, and species level)[44-48]. Future human ecological cognitive linguistic theory[49] must understand the different environmental factors influencing the multilevel species ecological traits (such as leaves, stem barks, roots[50], resources and genetic breeding[51], synthetic metabolism[52], biodiversity[53], adventitious roots[54], microbiome shift[55], anti-infective plants[56]) for decrease ecosystem collapse and biodiversity loss[57] by green chemical approach[59], phytochemistry and therapeutics methods[59] or other ways.

ACKNOWLEDGEMENT

This work was supported by A Grade of Key Disciplines of Environmental Science Foundation, B Grade of Key Disciplines of Mistrials Science of *Ping-Ding-shan University* in China; Science and Technology Department of *He'nan Province* Foundation (KJT-17202310242; 092102110165) ; Subprojects by Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES); and better ideas of researchers of "1st Biotechnology World Congress" in 2011, "2st Biotechnology World Congress" in 2012, "3st Biotechnology World Congress" in 2013 is appreciated.

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