



Links of Biomass of (*Smilax Scobinicaulis*) Dry Leaves and Daily Solar Radiation

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Abstract

(*Smilax scobinicaulis*) not only is a vital medicinal material plant by treating joint pain, but also it is a widely distributed wide plant species from 500m to 3100m in *Mei County* of China. However, understanding links between total biomass of dry leaves and daily solar radiation is difficult. This study explained that it is an increasing of total biomass of dry leaves with increasing of daily solar radiation as well as links between total biomass of dry leaves and daily solar radiation is the significant positive connection from $20.578\text{mol/m}^2 \cdot \text{d}$ to $24.158\text{mol/m}^2 \cdot \text{d}$ along elevation from 500m to 1500m ($P < 0.01$); it is a decreasing of this total biomass of dry leaves with increasing of daily solar radiation as well as the links between this total biomass of dry leaves and daily solar radiation is a significant negative connection from $24.15\text{mol/m}^2 \cdot \text{d}$ to $27.246\text{mol/m}^2 \cdot \text{d}$ along elevation from 1500m to 3100m ($P < 0.01$). This research provides a series of areas ecological adaptation of daily solar radiation and six landscapes of this species. Therefore, this has vital theoretical and practical significance by medicinal plant species protection for better future of human health, ecosystem services and ecosystem functions along daily solar radiation gradient.

Keywords: Total biomass of dry leaves; daily solar radiation; links; medicinal; areas ecological adaptation.

1. Introduction

More and more researches have assessed the links between total biomass of dry leaves of medical plants and environments along elevation from total biomass of dry leaves (plant functional groups, biodiversity, height, total biomass of dry leaves) of medicinal plant species perspective by biodiversity researches (Table 1) [1-21], which based on better future of human health by the finding medicinal plants. However, traditional medicinal plant species with typical history spanning over 1500 years, as well as areas ecological adaptation of total biomass of dry leaves of plant are unknown and values of medicinal species also cannot be utilized [3-12].

(*Smilax scobinicaulis*) not only is a vital medicinal material plant of treating joint pain, but also it is widely distributed wide specie along elevation from 500 to 3100m by “big data” of our long-time investigation in *Mei County*. The species is belonging to *Smilax L.* genus of Liliaceae families of Monocotyledoneae in Angiospermae. However, understanding the links between total biomass of dry leaves of medical plants and dynamics of daily solar radiation along elevation is unknown, as well as the links between total biomass of dry leaves of plants and daily solar radiation is difficult finding along elevation and environmental factors [1-21] (Table 1).

And, elevation and environmental (daily solar radiation, disturbances) gradient also influence on total biomass of dry leaves (biomass, biodiversity, structure, et al.) of plant species in “big data” investigation of our long years researches. Explaining values of medicinal spices and the links between total biomass of dry leaves of medicinal plant and the daily solar radiation and different areas ecological adaptation of medical plants is a vital rule.

As such, there is not only the vital links between total biomass of dry leaves of species and daily solar radiation, but also there is a series of (good, better, best) this species areas ecological adaptation of daily solar radiation in six near-natural ecosystem for the better future of ecosystem structures (functions, composition, and services) and human future well-being and public health over spatial-temporal-environmental-disturbance scales (STEDS).

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

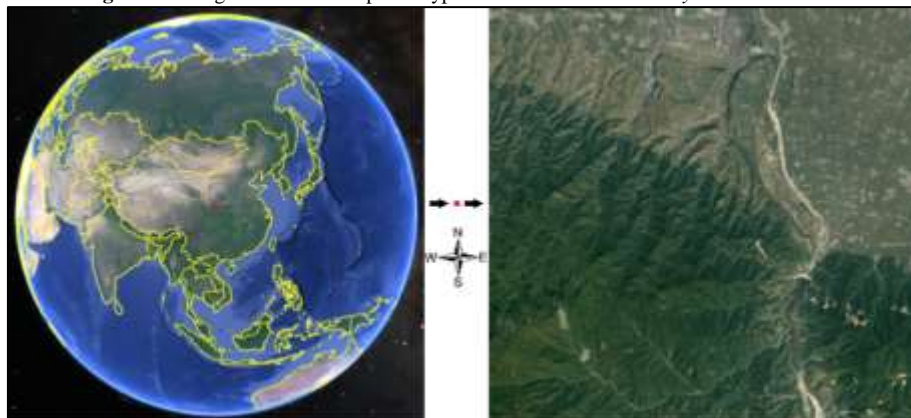
Table-1. Evaluation of Linkages between of Medicinal Plant Dynamics and Environmental Factors

Assessments of links between multilevel medicinal plant and environs	Authors
Links between biodiversity of plant functional groups and elevation at STEDS.	[21].
Links between biomass of medicinal herbs and elevation in wetland landscape.	[13].
Links between plant functional groups diversity and elevation in forest.	[14].
Links between plant functional groups and elevation in near-natural forests.	[16].
Links between number of medicinal tree species and elevation in forestation.	[15].
Links between average height of medicinal tree and elevation in landscapes.	[17].
Links between medicinal tree trunk volume and elevation in forests.	[18].
Links between number of tree community crown volume and elevation.	[19].
Links between number of individual specie's crown volumes and elevation.	[20].
Links between plant diversity and different disturbance of different elevation.	[1].
Links between dry weight biomass of biomedical plant and elevations.	[2].
Links between total biomass of fresh weight of medical plant and elevations.	[4].
Links between vegetation coverage of biomedical plant and elevation.	[5].
Links between pair's co-dominance abundance dominancy and elevation.	[6].
Relation between plant average height of biomedical plant and elevation.	[7].
Links between biomass of biomedical plant roots cuticle and elevation.	[8].
Links between biomass of medical plant roots cuticle and daily solar radiation.	[9].
Links between leafstalk biomass of biomedical plant and elevation.	[10].
Links between biomass of biomedical plant stems cuticle and elevation.	[11].
Links between Important Values of biomedical plant species and elevations	[3].
Links between moisture content of biomass of biomedical plant and elevation.	[12].

2. Material and Methods

2.1. Environmental Condition, Situation of Special Typical Vegetation and Research Methods

Typical area is local in three vegetation zones in China: firstly, evergreen vegetation in north subtropical zone; secondly, evergreen and deciduous coniferous and broad-leaved mixed forest in north subtropical and warm temperate transition; thirdly, deciduous vegetation in warm temperate zone by large total biomass of dry leaves investigation of medicinal plant. Thus, our research area is local in evergreen and deciduous coniferous and broad-leaved mixed forest in north subtropical and warm temperate transition (landscape types included: urban, rural settlement, wetland, forest, grassland, farmland, river landscape as well as mixed zone landscape interaction each other) along elevation and environmental gradient in *Mei County* of China (Figure 1).

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

2.2. Typical Location in *Mei County* of China of Earth

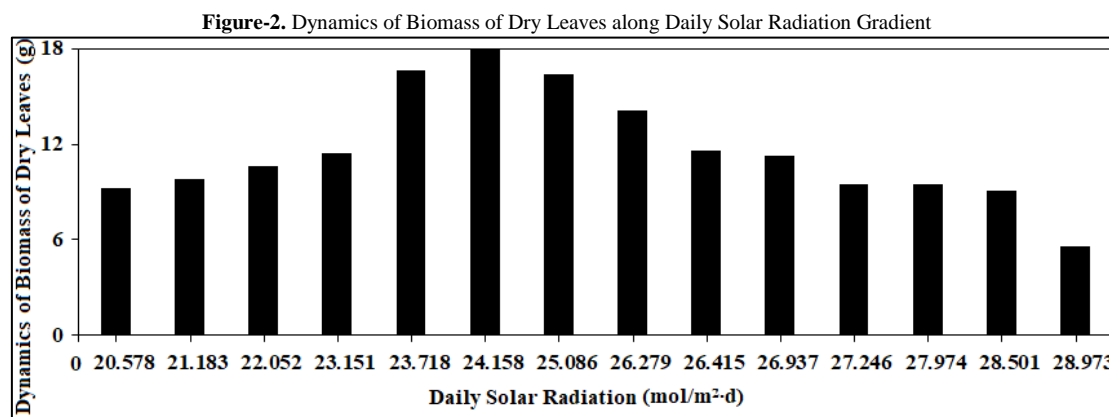
There is a long time investigation by the links between medicinal plant species diversity and environments from 2005 to 2020. “Big data” included that dynamics of total biomass of dry leaves of medicinal plants or other index (*Fu-niu Mountain, Yellow River, Ye County, Yi-luo River, Bai-gui Lake, Mei county*, et al.) [1-20].

In short, it is a link between total biomass of (*Smilax scobinicaulis*) dry leaves and daily solar radiation, as well as it is a series of (good, better, best) natural landscapes areas ecological adaptation of daily solar radiation of this medical plant species by the “big data” of the ecological investigation, qualitative analysis, quantitative statistics, eco-rules, theories, methods and ways along elevation and other environmental gradient [3, 5-12, 22-28].

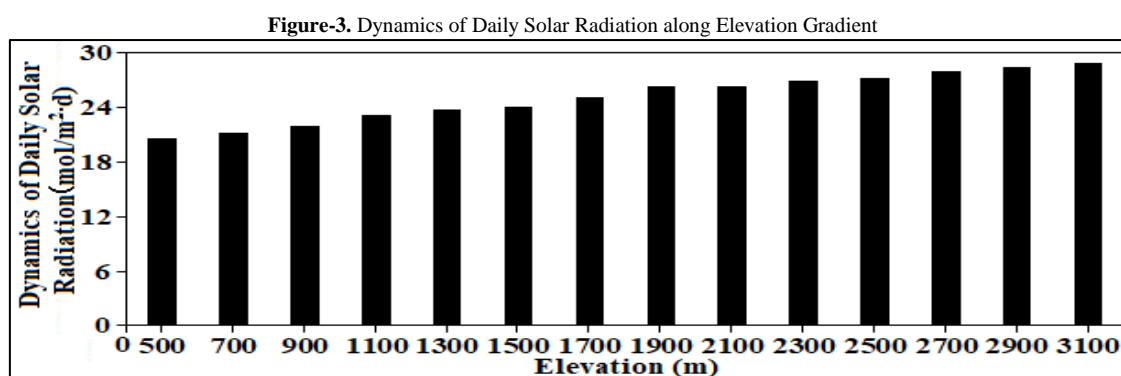
3. Results and Analysis

(*Smilax scobinicaulis*) not only is a vital medicinal material plant of treating joint pain, but also it is widely distributed wide plant species along elevation from 500 to 3100m in natural ecosyleaves along elevation from 500m to 3100m in *Mei County*. However, understanding daily solar radiation effect on the links between this total biomass

of dry leaves and daily solar radiation is very difficult. Using “big data” investigation, this research suggested there are three rules along increasing of daily solar radiation and elevation in *Mei County* of China:



Firstly, this work proposed that not only it is an increasing of total biomass of dry leaves of this plant species with the increasing daily solar radiation, as well as it is a significant positive correlation between total biomass of dry leaves of this species and daily solar radiation from 20.578mol/m²·d to 24.158mol/m²·d ($P<0.01$) along elevation from 500m to 1500m, but also it is a decreasing of total biomass of dry leaves of this plant species with the increasing of daily solar radiation, and it is a significant negative correlation between total biomass of dry leaves of this plant species and daily solar radiation from 24.158mol/m²·d to 28.973mol/m²·d ($P<0.01$) from 1500m to 3100m. Because there is an increasing of daily solar radiation with increasing daily solar radiation and elevation is a significant positive correlation from 500m to 3100m elevation ($P<0.01$) (Figure 2, 3; Table 2, 3).



Firstly, this paper provided good areas ecological adaptation of daily solar radiation of this medical plant species is local in the areas ecological adaptation of daily solar radiation from 20.578mol/m²·d to 28.973mol/m²·d along elevation from 500m to 3100m. Secondly, there are better areas ecological adaptation of daily solar radiation of this species from 23.151mol/m²·d to 27.974mol/m²·d along elevation gradient from 1100m to 2700m, but also there are the best areas ecological adaptation of daily solar radiation of this medical plant species from 23.718mol/m²·d to 25.086mol/m²·d along elevation from 1300m to 1700m at STEDS in *Mei County* (Figure 2, 3).

Table-2. Connection between Total Biomass of Dry Leaves and Daily Solar Radiation

Daily Solar Radiation along Elevation Gradient	Plant Biomass of Dry Leaves
Daily Solar Radiation From 500m to 1500m	0.900*
Daily Solar Radiation From 150m to 3100m	-0.970**

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

Thirdly, herein suggested that medicinal plant (*Cremastra appendiculata*) of treating joint pain is local in six natural landscape types (forest, mixed between grassland and forest, mixed between forest and wetland, mixed between forest and river, mixed between forest and urban, mixed between forest and rural settlement), because of there is result of dynamics of air and soil environments along elevation and daily solar radiation (Figure 1).

Table-3. Connection between Total Biomass of Dry Leaves Daily Solar Radiation Gradient

Elevation (m)	Elevation Gradient from 500m to 3100m
Daily Solar Radiation	0.992**

Note: **, $P<0.01$.

As such, this research finds typical (good, better, best) areas ecological adaptation of (*Smilax scobinicaulis*) of treating joint pain at daily solar radiation, and it is a link of total biomass of dry leaves and daily solar radiation.

4. Discussion

Explaining dynamics of total biomass of dry leaves of medicinal species is very difficult [2-12, 22, 24-31]. Herein suggested three rules with biomass of dry leaves of this medicinal species along elevation and daily solar radiation:

Firstly, it is a significant positive connection between total biomass of dry leaves of this species and daily solar radiation along elevation from 500m to 1500m ($P < 0.01$), because of it is an increasing of total biomass of dry leaves with increasing of daily solar radiation from $20.578 \text{ mol/m}^2 \cdot \text{d}$ to $24.158 \text{ mol/m}^2 \cdot \text{d}$. At the same time, it is a significant negative connection between Total biomass of dry leaves and daily solar radiation along elevation from along elevation from 1500m to 3100m ($P < 0.01$), because of it is a decreasing of total biomass of dry leaves with increasing of daily solar radiation from $24.158 \text{ mol/m}^2 \cdot \text{d}$ to $27.246 \text{ mol/m}^2 \cdot \text{d}$ ($P < 0.01$) at STEDS.

Secondly, this work provided good areas ecological adaptation along elevation from 500 to 3100m, the better areas ecological adaptation along elevation from 1100 to 2500m, and the best areas ecological adaptation of daily solar radiation of this medical plant along elevation from 1300 to 1700m is local in *Mei County* (Figure 2, 3).

Thirdly, this research suggested that total biomass of dry leaves of this species of treating joint pain is local in six near-landscape types (forests, mixed landscapes between forestation and wetland, mixed landscapes between grassland and forestation, mixed landscapes between forest and urban, mixed landscapes between forest and river, mixed landscapes between forest and rural settlement) by “big data” along elevation gradient (Figure 1).

Therefore, herein has key theoretical and practical significance for the reasonable protection of total biomass of dry leaves of this species along the daily solar radiation and elevation gradient in six natural landscapes. Because of this plant species not only is a vital widely distributed wide medicinal plant species of treating joint pain, but also there are three rules by the links between total biomass of dry leaves of this species and daily solar radiation. In short, regional planners need regulation a lot of landscape sustainability based on researches on total biomass of dry leaves of medical plant species (biodiversity, composition, structure, et al.) by the “eco-big data” investigation, qualitative analysis, quantitative statistics, human cognitive ecological linguistic rules and theory of the links between biodiversity and environments in the global, local, regional landscapes for the better future of human health and ecosystem leaves stability and functions along daily solar radiation, environments [22-28, 30-32].

Therefore, herein provides a series of areas ecological adaptation of daily solar radiation and six landscapes of this species, which has vital theoretical and practical significance by medicinal plant species protection for better future of human health, ecosystem services along daily solar radiation, elevation or other environmental gradients (e.g., light, heat, water, soil nutrients, air, topography and landform).

5. Future Work

Indeed, a better regional regulator and local government need a 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 for better future of vegetation and human well-being [29, 33-43].

Next work this research 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 plant leaves, plant stem barks, plant roots [50], green ecological habitat resources and genetic breeding [51], synthetic metabolism [52], multilevel diversity [53], adventitious roots [54], microbiome shift [55], anti-infective plants [56] for decrease ecosystem collapse and species diversity loss [57] by green chemical approach [58] and phytochemistry, therapeutics methods [59].

6. Conclusion

This work firstly find that (*Smilax scobinicaulis*) not only is a vital medicinal material plant by treating joint pain, but also provides a series of areas ecological adaptation of daily solar radiation and six landscapes (wetlands, water, grasslands, forests, countryside and farmlands) of this species. Just as it is a significant positive connection between total biomass of dry leaves and daily solar radiation from $20.578 \text{ mol/m}^2 \cdot \text{d}$ to $24.158 \text{ mol/m}^2 \cdot \text{d}$ along elevation from 500m to 1500m ($P < 0.01$); it is a significant negative connection between total biomass of dry leaves and daily solar radiation is a significant connection from $24.15 \text{ mol/m}^2 \cdot \text{d}$ to $27.246 \text{ mol/m}^2 \cdot \text{d}$ along elevation from 1500m to 3100m ($P < 0.01$). Therefore, this work firstly has been found interrelations between total biomass of dry leaves and daily solar radiation. It is a theoretical and practical significance by medicinal plant species protection by treating joint pain for better human-wellbeing and conservation of medicinal material specie.

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