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ELEVATION DYNAMICS OF (*SOPHORA JAPONICA*) COMMUNITY'S HEIGHT IN *YE COUNTY*

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ABSTRACT

Applying plant communities diversity techniques and SPSS statistic analysis, we quantify how that the relationship between (*Sophora japonica*) tree community's height and elevation along elevation gradient in *Ye County* in the paper. We concluded that there is a significantly positive correlation between (*Sophora japonica*) tree community's height and elevation ($P<0.01$). Elevation is the dominant environment driver of (*Sophora japonica*) tree community's height increased along elevation from 50m to 200m in *Ye County* in 2018. Therefore, understanding dynamic connecting of (*Sophora japonica*) community's height and elevation can be not just applied to preserve of (*Sophora japonica*) communities, but also applied to sustainable of biodiversity and community's processes along elevation gradient.

KEYWORDS

Sophora japonica tree communities, Elevation gradient, Relationship, Positive correlation and International pharmaceutical materials.

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INTRODUCTION

The relationship between tree communities and elevation include tree community's structure, forest carbon use efficiency[1], forest soil organic matter, forest soil carbon, forest water soluble organic matter[2], forest geographical variation[3], forest habitat use by animals[4], forestry insects[5, 6], plant species mixture increases forestry production[7] in the environmental (disturbance[1, 4], soil[2], water[2], climate

warming[3], effects of insects[5,6]) dynamics along elevation gradient in the ecosystems. However, there are the relationship between height of (*Sophora japonica*) tree communities and environments along elevation gradient in *Ye County* of *Henan Province* of China.

Unfortunately, the differential tree community's concept is used as a framework for investigating the linkages between tree communities and elevation habitats[8]. Moreover, more and more experiments or models have assessed the relationship between tree communities and elevation along elevation or disturbance gradient[9-13]. For example, Liao *et al*, (2011a, 2014) found that importance values of tree species were significantly correlated with elevation along elevation gradient on the northern and southern slope of the *Fu-Niu* Mountain[10, 11]. Liao *et al*, (2011b) proposed that plant biomass were significantly correlated with elevation gradient in the typical wetland area of *Yi-Luo* River watershed[12]. Liao *et al*, (2014b) suggested that plant diversity were significantly negatively correlated with disturbance gradient[13]. Moreover, *Sophora japonica* is an important international pharmaceutical materials.

Therefore, the objective of this research was to define the relationship between height of (*Sophora japonica*) tree communities and elevation gradient at different plant community's levels in the different forest ecosystem of *Ye County* in 2018.

THE PHYSICAL GEOGRAPHIC CONDITIONS AND STUDY METHODS

Ye County is an important county in *Ping-ding-shan Region*. The urbanization of ecosystem is results of the historical natural and anthropogenic activities in *Ye County*. It is regional urbanization mostly in the height of more than 600 m (Figures No.1-4, Table No.1 and 2). Three fields of plant diversity of investigations were conducted in 2018, investigating the indigenous plant diversity in *Ye County*, which is ideal for studying distribution and features of biodiversity (Figures No.1-4, Table No.1 and 2).

A field investigation was conducted in 2018, to study the dynamics of (*Sophora japonica*) tree community's height and elevation along elevation in the ecosystem of *Ye County*. The (*Sophora japonica*) tree community's ecosystem of *Ye County* is the dominated by natural ecosystem with tree species from 50m to 650m. Possessing steep environmental gradients along the different elevation gradient, this area is idea for studying (*Sophora japonica*) tree communities (Figures No.1-4, Table No.1 and 2).

Applying plant community ecology techniques, GIS of techniques, a number of rasterizing of landscape maps, SPSS statistic analysis, we investigated all plant species (dominant and companion tree communities) along elevation gradients on the southern, southeastern, western, eastern, northern, southwestern, northeastern, and northwestern of *Ye County* in 2018 along elevation gradient (Figures No.1-4, Table No.1 and 2).

There are 8 study plots establishing in per 10 m elevation by different azimuth and direction (East, West, South, Southeast, Southwest, North, Northeast, and Northwest) in 2018. A total of 60 plots were set in three times investigating. Each study plot (Figures 1-4), consisted of one 20 × 20 m tree layer quadrate, five (the center and four corners of the study plot) 2 × 2 m shrub layer quadrates and 1 × 1 m herb layer quadrates. Thus, there were 180 tree layer, 900 shrub layer, and 900 herbaceous layer quadrates (Figure No.1-3, Table No.2-4). Moreover, different plant species identified during this investigation were assigned into three communities according to plant life form: 1) tree communities; 2) shrub communities; 3) herb communities[9-13].

RESULTS AND DISCUSSION

The study showed four rules of the relationship between (*Sophora japonica*) tree communities and elevation along elevation gradients (Figure No.5, Table No.3).

Firstly, these shows there are 18 types of (*Sophora japonica*) tree communities along differential elevation between 50 and 200 m of *Ye County*.

Secondly, this study show that the dominant (*Sophora japonica*) tree community increased along elevation gradients of *Ye County* in 2018.

Thirdly, the study analyzed the relationship between the (*Sophora japonica*) community's height and elevation. Regression equation is "y=0.0836x + 3.8582".

Fourthly, this study showed that there is a significantly positive correlation between (*Sophora japonica*) community's height and elevation (P<0.01)

Thus, the research explained that elevation is the dominant natural environment driver of height of (*Sophora japonica*) tree community's 18 types increased along elevation gradient from 50 m to 200 m in *Ye County*.

This study showed that three key areas will substantially further effects to gain a rigorous understanding of four rules:

1. There are 18 types of (*Sophora japonica*) tree communities along differential elevation between 50 and 200 m of *Ye County* in 2018.
2. The dominant (*Sophora japonica*) tree community increased along elevation gradients of *Ye County* in 2018. Regression equation is "y=0.0836x + 3.8582".
3. This study showed that there is a significantly positive correlation between (*Sophora japonica*) tree community's height and elevation of *Ye County* (P<0.01).
4. This study showed that elevation was the dominant environment driver of (*Sophora japonica*) tree community's height increased along elevation gradient in *Ye County*.

Therefore, the results indicate that elevation was the dominant environment driver of (*Sophora japonica*) tree community's height increased along elevation gradient. This paper explained that there is a significantly positive correlation between *Sophora japonica* tree community's height and elevation (P<0.01) only from 50m to 200 m in *Ye County* in 2018. Meanwhile, the research explained that elevation is the dominant natural environment driver of (*Sophora japonica*) tree community's height of international pharmaceutical materials increased along elevation gradient from 50 m to 200 m in *Ye County*. Thus, this study supported the experiments or models that elevation gradient is the most important environmental factor affecting dynamics of tree communities distribution[14], tree community variation[15], species richness distribution[16], dynamics of tree diversity (tree stand structure and tree community composition)[17,18] in the natural ecosystems along the local elevation gradients.

Table No.1: The physical geographic conditions and vegetation in *Ye County*

S.No	Location and Elevation	Climatic/Area	Vegetation (Plant Functional Groups)
1	Latitude(º): 33.42-33.68	Precipitation (mm):724	Trees: Ulmaceae/ Cupressaceae/ Moraceae/ Moraceae/ Platanaceae, *Sophora japonica*, *et al*.
2	Longitude(º): 113.27-113.46	Temperature(ºC) (Mean) :15.2	Shrubs: Rhamnaceae/ Verbenaceae/ Buxaceae/ Oleaceae/ Rosaceae/ Vitaceae/ Bignoniacea/ Cornaceae, *et al*.
3	Elevation(m) †: 50-650	Sunlight: 2230h Area(km^2):1387	Herbs: Compositae/ Leguminosae/ Urticaceae/Gramineae/ Convolvulaceae/ Cyperaceae/ Liliaceae/ Umbellferae, *et al*.

†Above sea level.

Table No.2: Investigation index along the elevation and disturbance gradient variable

S.No	Investigation	Disturbance Types /Intensity/Frequency	Layer	Community	Species	Height	Crow	Diameter
1	Different plant community investigation	Differential Artificial disturbance /Natural disturbance	Trees /shrubs /herbs	Coverage/ community's age structure	Species/ individual number	Different Layer's Height	Crow Height /width	Different basal diameter

Table No.3: Correlating to (*Sophora japonica*) community's height and elevation.

S.No	Tree Plant Communities	Relationship between of *Sophora japonica* tree community's height and elevation
1	*Sophora japonica*	0.838**

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

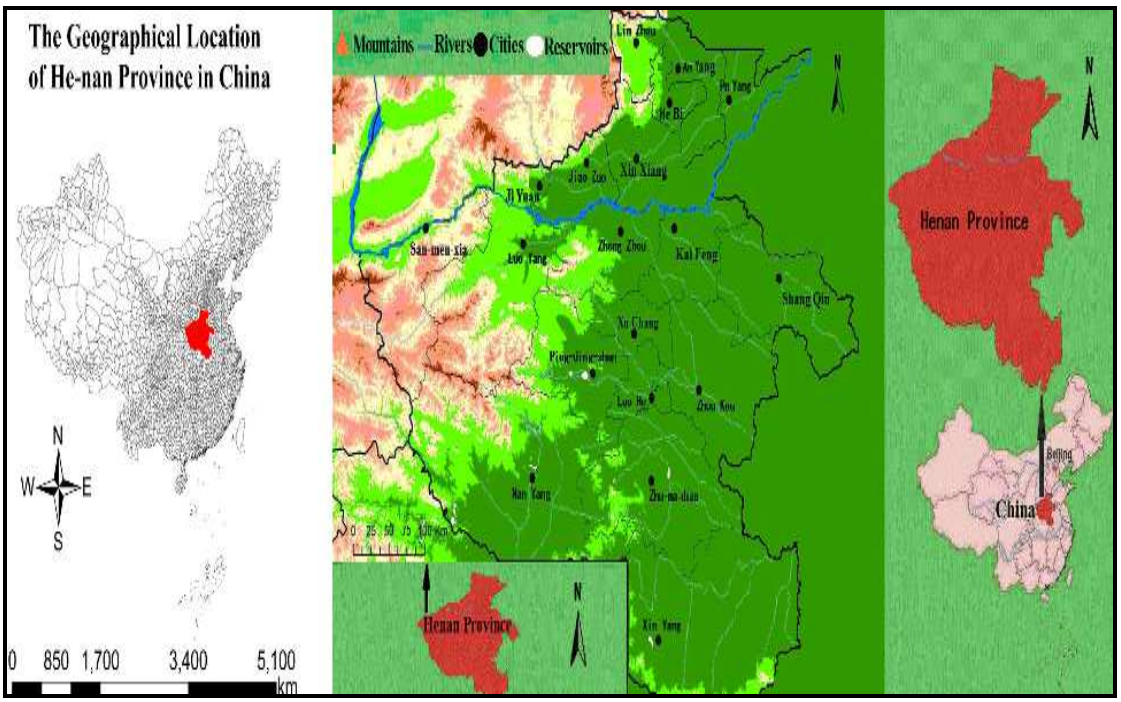

Figure No.1: A Digital Cadastre Map of Location of *He-nan Province* in China

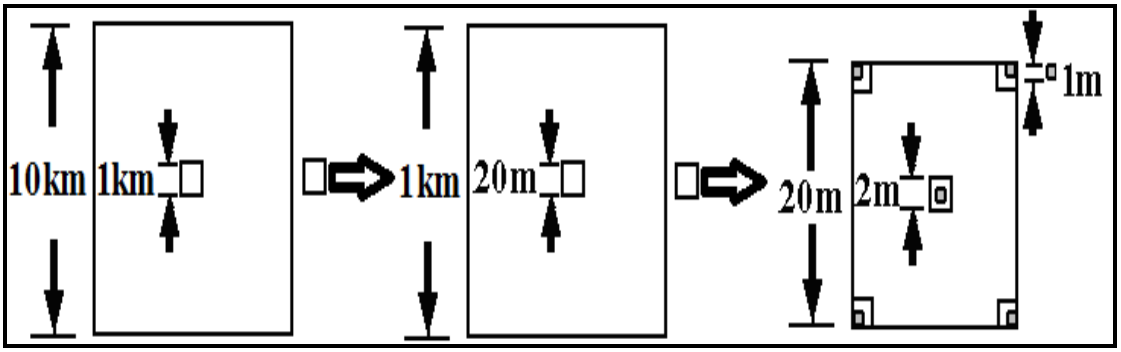

Figure No.2: Quadrate settings

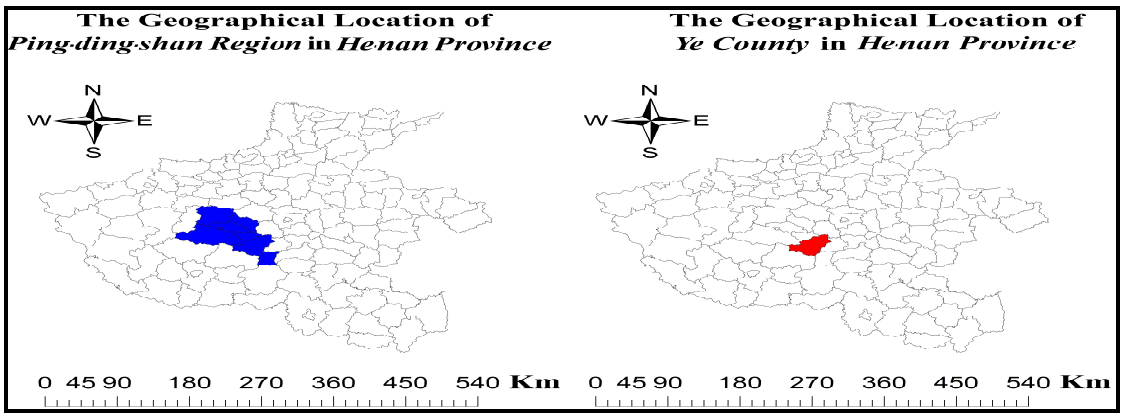

Figure No.3: The Geographical Location of Ping-ding-shan Region in He-nan Province and the Geographical Location of Ye County in He-nan Province

Note: Ping-Ding-Shan Region Ye County

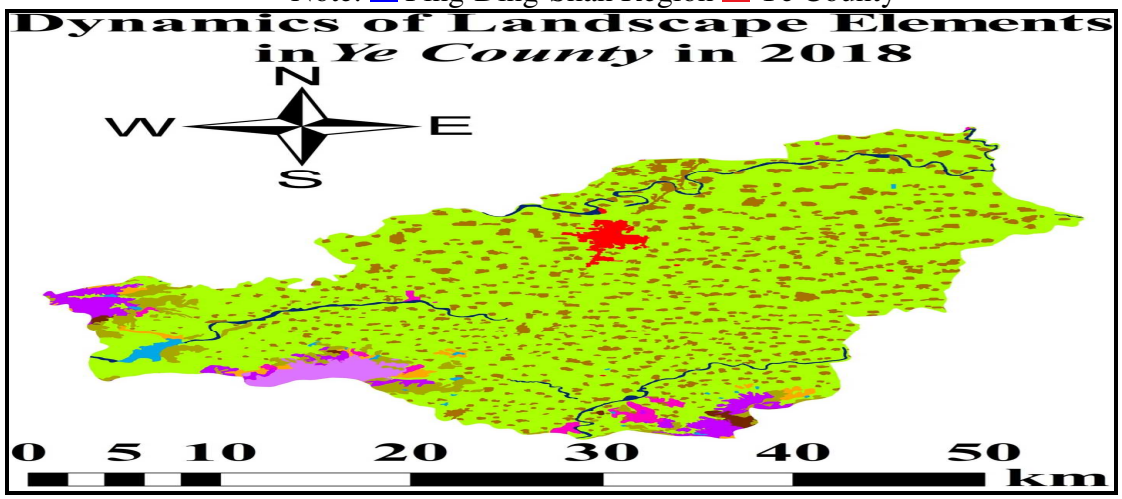

Figure No.4: Dynamics of different landscape areas and landscape perimeters and landscape patch numbers in *Ye County* in 2018

Note: Urbanization of Land Use Farmlands of Land Use Rural Settlements of Land Use Reservoirs Rivers and Wetland Plantation of Land Use Natural Forest of Land Use Grassland of Coverage Ratio during 20%~50% Grassland of Coverage Ratio >50%

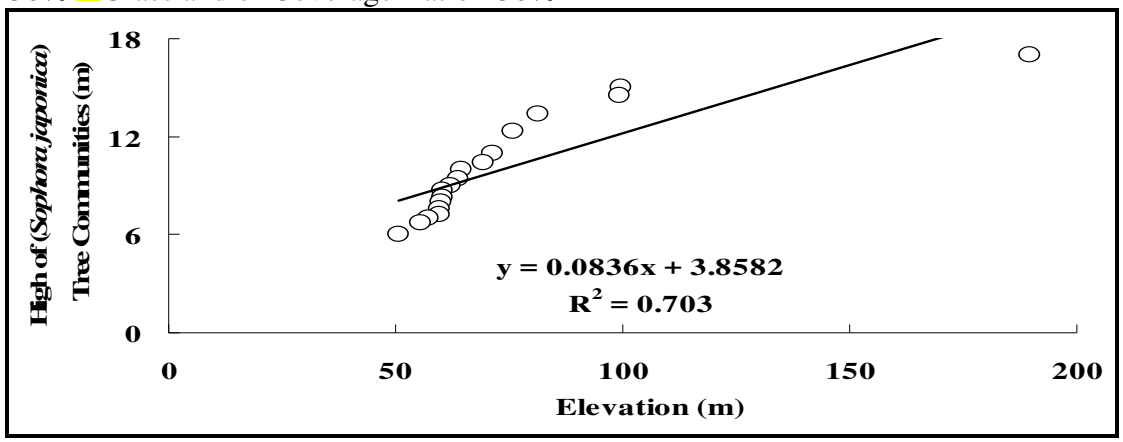

Figure No.5: Dynamics of (*Sophora japonica*) tree community's height along elevation

CONCLUSION

In this paper, we showed that elevation gradient as the dominant environment driver of height increased of 18 tree community's types along elevation from 50 m to 200 m in Ye County in 2018. Meanwhile, there is a significantly positive correlation between tree community's height and elevation by a key regression equation analysis along the different elevation gradient.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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