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Eco-Chemical Status Of *Artemisia Parviflora* In Uttrakhand And Its Significance In Composting

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ABSTRACT

The density and biomass studies were carried out with vegetation characteristics of five land use systems located geographical coordinate 29^0 03′-29^0 55′ N and 79^0 02′-79^0 40′ E. the soil characteristics were measured to evaluate the productivity of the *A.parviflora* in different land use systems. The growth of the plant is independent of the land use systems. The composting with the plant was carried out with pine needle based farm yard manure and poultry waste. The organic carbon was measured in different composition in compost in the study to the plant material enhance the efficiency of the compost.

KEYWORDS

Artemisia parviflora;
Biomass;
Compost;
Organic carbon;
C:N ratio;
Uttrakand hills.

INTRODUCTION

Plants are known to have various economic values to living beings. They are used in the preparation of medicines, pesticide, soaps, paper etc. They also play an important role in biological activities and weathering. *Artemisia parviflora* widely scared in the different land use systems of uttrakhand himalayas. The survey of literature shows that *Artemisia annua linn* and *A.maritime* have been used as an anti-malarial and especially for cerebral malaria[1,2]. *Artemisia parviflora* is reported as a source of essential oil compositions[3-6]. The environmental and biological characteristics are measurable properties of the plants, which provides interaction parameters between its nutrients and significant treatments for agriculture utility.

The present study mainly deals with the following objectives (i) To study the density and biomass of *A.parviflora* with other flora in the different

landuse systems, (ii) To examine the soil nutrients relationship with biomass and density of the *A.parviflora* at different soil functioning of landuse systems, (iii) To estimate plant nutrient in connection to the effect on traditional used farm yard manure(pine needle based) of *A.parviflora* to utilize its full potential in agriculture.

EXPERIMENTAL

Study area

The representative study sites were chosen to cover the uttrakhand himalayan region. It is located between geographical coordinate $29^0 03'$-$29^0 55'$N latitude and $79^0 02'$-$79^0 40'$E longitude and is known as almora binsar area. The climate of the area is temperate with pronounced summer, winter and rainy seasons.

Sampling design

For the estimation of the effect of different climatic, geological and cultural practices on existing land use ecosystems, the vegetation measurement and the soil samples were collected in the monsoon(flowering stage) and winter season(litter fall stage) in each year from a plot of $100m^2$(0.01ha) size(n=3).

Methodology

Soil samples were collected from 0-20cm soil depth from described plots with help of sampler, mixed thoroughly, dried and used for determination various physical and chemical properties. The physico-chemical characteristics of the soil have been analyzed as given methods[7–8]. The surface vegetation cover, plant density and biomass were estimated according to the reported methods[9]. The vegetation characteristics of different landuse systems of almora-binsar study area are given in TABLE 1.

For estimation of nitrogen, the samples were digested in 10ml concentrated sulfuric acid and catalyst(5gm potassium sulphate+0.1gm copper sulphate) at 420^0C in an aluminum block digester. The samples were then analyzed in K-JELTEC, auto 1030 analyzer(TECATOR, Sweden) for total nitrogen. Available phosphorus was determined by bray extract method, by chlorostannous-reduced molybdophosphoric blue colorimetric method using 5gm soil sample extracted with 50ml bray extract. Available potassium was estimated using a flame photometer. Data were analyzed statistically with the help of reported[10]. The obtained soil characteristics of different landuse systems of the study area are given in TABLE 2.

The process of composting of farm yard manure was carried out at different composition with Artemisia and compost obtained was analyzed for nutrient pools. The reported methods[8] were used for the estimation of organic carbon, total nitrogen, available phosphorus and potassium. The pH values were also measured for each compost prepared in the study. The estimated values of nutrient pools are given in TABLE 3.

TABLE 1: Density and biomass of *Artemisia parviflora* with vegetation chracterstics of landuse systems of almora-binsar area

Landuse Systems	Surface vegetal cover (%)	Tree density (no/ha)	Total tree basal area (m^2/ha)	Crown cover (%)	Total no.of herbs	Total no. of grasses	Density of *A.parviflora* (No/ha)	Biomass of *A.parviflora* (kg/ha)
Open pine forest	44±03	210±04	30.2±2.3	56±2.3	11	03	4913 ±24	6850 ±20.4
Reserve forest	87±05	-	-	-	17	04	9608 ±31	9800 ±24.3
Grass/pasture land	61±02	1600±12	0.42±0.1	78±0.1	7	02	8100 ±18	8100 ±22.1
Rainfed agriculture terrace riser	78±01	110±07	5.08±1.2	29±1.2	16	04	11400 ±34	11000 ±29.8
Grazed land	39±03	-	-	-	7	03	4600 ±13	260 ±11.1

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TABLE 2: Soil characteristics of different landuse systems of almora-binsar area

Characteristics	Open pine forest	Reserve forest	Grass/pasture land	Rainfed agriculture terrace riser	Grazed land
CEC(meq/100gm)	8.68	13.24	14.56	10.24	12.16
pH	6.39	6.34	6.16	6.16	6.84
O.M.(%)	2.82	2.56	2.05	2.55	1.64
Total N(%)	0.413	0.162	0.167	0.236	0.102
C:N ratio	11.5	9.02	7.44	6.28	9.34
Available P(kg/ha)	39.5	32.4	34.3	32.3	34.8
Available K(kg/ha)	229	270	216	286	137

Note: ECE=Cation exchange capacity, OM=Organic matter

TABLE 3: Nutrient pools in different composition of *Artemisia parviflora*-compost

Compost composition	pH	Organic carbon (mg/gm)	Total nitrogen (mg/gm)	Available P (mg/gm)	C:N ratio	N:P ratio
A	6.40	7.27	0.21	0.002	7.98	100.00
B	6.22	10.16	1.86	0.032	5.46	58.12
C	6.80	13.82	2.31	0.041	5.98	58.34
D	7.03	17.04	3.44	0.062	4.95	55.48
E	7.10	21.33	4.38	0.079	4.86	55.44
F	7.60	16.44	5.04	0.119	3.26	42.35
G	7.80	20.14	6.17	0.148	3.26	41.69

A-Soil(100%), B-Soil(60%)+Pine needle(40%), C-Soil(60%)+Artemisia parviflora plant material(40%), D-Soil(60%)+Artemisia parviflora plant material(30%)+Cow dung(10%), E-soil(60%)+Artemisia parviflora plant material(20%)+cow dung(20%), F-Soil(60%)+Artemisia parviflora plant material(20%)+Poultry waste(10%), G-Soil(60%)+Artemisia parviflora plant material(20%)+Poultry waste(20%)

RESULTS AND DISCUSSION

Landuse systems and soil nutrient studies

Before discussing the various relationships related to *Artemisia parviflora* plant with environmental conditions of uttrakand himalayas, it is necessary to discuss the relationship between density of the plant with its biomass in different landuse systems. The density of the plant is highest in the rainfed agriculture and it is nearly equal in open pine forest and grazed land. These results revealed that the open pine forest is least suitable for the growth of the *Artemisia parviflora.* The variation of density of the plant with different landuse systems is in the following order, rainfed agriculture>reserve forest>grass land>open pine forest>grazed land. The ratio of biomass/density is nearly constant for each landuse systems except grazed land.

It is well established fact[11] that the soil quality for the environmentalist mean soil functioning at its potential in an ecosystem with respect to in enhancement of bio-diversity, soil moisture, nutrient cycling and biomass production. It can be concluded from the results, all landuse systems are efficient for the growth of *Artemisia parviflora* the cultivation of plant can improve the lower vegetation status of the region.

The data of the soil nutrient obtained in the study as indicated in the TABLE 2 reveal the fact that the open pine forest having equally efficient for the production of *Artemisia parviflora*, which is in general not efficient for other vegetation.

Compost preparation studies

The mean concern of the composting is the quantity is the final out put compost, which depends on the quality of segregated organic waste. The un-segregated waste gives poor compost. Organic matter obtained in composting directly depends upon the organic carbon. The organic matter is a key component in assessing the fertility of the soil with two other component nitrogen and phosphorus.

The soils of uttrakand hill in general have low fertility. In this study the conclusion drawn that the *Atemeisia parviflora* can grow easily in each landuse system, is of most practical importance. The atten-

tion has been focused on the availability and utility of plant in improving pine needle based farm yard manure, which the only source of plant nutrient in agricultural purpose.

The analysis of the compost prepared by pine needle based farm yard and *Artemisia parviflora*, have nearly equal C:N ratio. The compost prepared with poultry waste and plant has very low C:N ratio. The pine needle based farm yard manure has maximum organic carbon. It is suggested that the composition of *Artemisia parviflora* with pine needle based farm yard manure through composting gives efficient compost.

The study is model for improving the existing traditional farming practices[12] with environmental balance and economic benefits.

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