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ARTICLE

Evaluation Of Biomass and Vegetative Propagation Of *Spilanthes oleracea* Jacq. (Asteraceae)

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ABSTRACT

Spilanthes oleracea Jacq. is an herbaceous plant whose scientific literature attributes among others, anti-malarial and anti-bilharzia properties. These virtues justify the placing on the market of drugs based on the plant. Our study consisted on the one hand to evaluate the biomass of the plant on a soil of dune amended and on soil of unamended dune and to test its vegetative multiplication by transplanting, cuttings and layering. The results show that the growth of the species is greater on dune soil amended with an average biomass of 106.06 g compared to 71.06 g for un-amended soil plants. The transplanting of the plants and the layering were techniques that made it possible to multiply the plants. *Spilanthes oleracea* Jacq. can be produced using this agronomic data.

1. Introduction

Spilanthes oleracea Jacq. is an annual or biennial herb known as *S. acmella* (India, Indonesia), *S. uliginosa* (Sudan, Cameroon, Mali), according to continents and authors [9,12]. It is a branched plant, 25 to 50 cm high.

This plant has been the subject of numerous studies bearing its chemical composition [2,3,4,13] and its pharmacological properties [5,6,7], which showed a real interest in this species in the management of certain pathologies such as malaria [2] and bilharziasis [6,7]. This interest is at the origin of the authorizations of its placing on the market under various names of specialties based on extracts of the plant, with like properties:

(1) analgesic in cases of sports-related injuries in France and Germany;

(2) antimalarial in Mali [2].

Because of these interesting prospects in the fight against malaria, we have undertaken to carry out trials of natural reproduction of this species.

2. Material and Methods

2.1 Framework of Study

The tests were carried out in the Niayes area of Dakar. It is an area of inter-dune depressions where the water table outcrops most often.

The climate is characterized by a long dry season and

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a short rainy season with average annual rainfall hardly exceeding 500 mm. The annual thermal average is of the order of 24 ° C.

2.2 Plant Material

(1) Seeds of *Spilanthes oleracea* Jacq.
(2) Sandy soil of unamended dune
(3) Sandy soil of dune amended
(4) Watering Cans
(5) Rakes
(6) Picks
(7) Excavators
(8) Precision balance
(9) Horse poop.

2.3 Conduct of the Test

The objective of the test is to evaluate the following parameters: the variation of biomass with soil type, the vegetative propagation of the species and the behavior of the plants at transplanting.

2.3.1 Study of the Variation of the Biomass According to the Soil

This study was conducted in January, which corresponds to a dry season and temperatures between 18 ° and 23 ° C.

For this test, 3 boards of 4 m^2 surface were prepared as follows:

(1) Planks 1 and 4: sandy soil of unamended sand dunes

(2) Planks 2 and 3: sandy soil of dunes amended with 5 kg of horse dung.

The earth of these planks was first drawn, crumbled before being watered with 20 liters of water. Shallow linear streaks were then made using a rake before sowing on the fly, at a rate of 1.06 g seeds per plank. Daily watering is done with the same amount of water.

After germination, the number of plants in each plank is decreased, so as to obtain 64 plants spaced 20 cm apart.

After 98 days, a period of maturity characterized by a flowering of the plants, a sample of 10 plants is taken and each plant is weighed using a precision scale, in order to determine its weight. The average of each sample is expressed in grams.

2.3.2 Study of Vegetative Propagation

This study deals with cuttings and layering of plants in Plank 1.

(1) Cutting trials

On a third sheet of sandy soil amended (Plank 3), prepared under the same conditions as Plank 2, 16 cuttings of the plants of Plank 1 were transplanted. These cuttings are obtained by taking from the mother plants cuttings of branches carrying knots.

The appearance of roots and buds is then followed during the test.

(2) Layout tests

At the level of the Plank 1, we buried in the ground, the stems of 16 other plants without detaching them from the mother plants. A follow-up was then made to observe the appearance of roots and buds on these stems. The separation of the mother plant is carried out when their size and rooting are sufficient. The results obtained from these tests are expressed as a percentage.

(3) Plant transplanting tests

The transplanting took place on the 73rd day of the planting of the plants of the plank 1. For that, 16 other plants of the plank 1 were transplanted on a fourth board with the sandy soil not amended (plank 4), respecting a distance of 20 cm between two plants. The percentage of surviving plants was expressed.

3. Results

The different tests concerning the evaluation of biomass and the study of vegetative regeneration of *Spilanthes oleracea* Jacq. gave the following results:

3.1 Study of the Variation of the Biomass According to the Soil

The evaluation of the biomass on an unamended sandy soil and on the same type of soil amended showed a remarkable variation in the weight of the plants obtained. In fact, an average weight of 71.06 g is obtained on the unamended soil plank against

106.06 g for the amended soil plank, a weight difference of 35 g. In addition, all the plants in the amended soil plank have a weight greater than that of the plant with the highest weight in the unamended soil plank (Table 1).

Table 1. Variation of plant biomass by soil type

Plant number	Plate n ° 1 (weight in grams)	Plate n° 2 (weight in grams)
1	71,09	100,87
2	70,12	108,03
3	73,17	100,11
4	70,43	106,38
5	70,16	106,53
6	71,06	110,91
7	72,45	98,63
8	71,23	112,16
9	68,27	105,48
10	72,76	111,47
Average	**71,06**	**106,06**

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3.2 Study of Vegetative Propagation

Compared to vegetative regeneration of the species, only layering and transplanting gave satisfactory results. In fact, the layering tests made it possible to obtain a regeneration rate of 68.75%, compared to 87.50% for transplanting (Table 2).

Table 2. Test results for transplanting and vegetative propagation of seedlings

Tests	Number of regenerated seedlings (N = 16)	Regeneration rate (%)
Transplanting	14	87,50
Cuttings	0	0
Layering	11	68,75

The cuttings trials were inconclusive.

4. Discussion

The objective of this present work was to compare the growth of *Spilanthes oleracea* Jacq. on two types of soil and to evaluate its vegetative multiplication capacity.

The comparative study of growth consisted of comparing the biomass of plants obtained after soil amendment to that of plants from unamended soil. The results obtained showed a notable difference in weight which favors plants from the amended soil. In fact, the average weight of the plants in the amended soil is 101.06 g against 71.06 g for the plants of the unamended soil. The weight difference of 35 g could be related to the soil characteristics of the Niayes area. Indeed, Ndoye & al [10] showed that Niayes soils are characterized by the salinity of surface horizons. Although they are rich in humus, they require nitrogen and phosphate amendments. The horse dung used as an amendment, made it possible to obtain a much higher biomass than that resulting from unamended soil.

Planting trials yielded an average success rate of 87.50%. This result suggests that large-scale production of the species requires the establishment of nurseries from which the feet will be harvested for transplant.

The layering tests were also successful with an average success rate of 68.75%. This result confirms the thesis of Koster [9] for whom, the plant can take root at the level of the lowest nodes and recover secondarily. The ability of the species to tease is an asset in the production of the plant.

Attempts to cut the species have been in vain. However, because of the therapeutic interest of *Spilanthes oleracea* Jacq., several works of multiplication of the species from cuttings, were carried out with very satisfactory results. This work focuses on *in vitro* micropropagation culture techniques in Murashige and Skoog (MS) medium [1,8,11].

5. Conclusion

The study showed that the biomass of *Spilanthes oleracea* Jacq. is significantly improved on dune soil amended with horse dung only on an unamended dune soil, with a difference of 35 g in favor of the seedlings of the amended soil.

Transplanting plants and layering with success rates of 87.50% and 68.7%, respectively, are techniques for multiplying seedlings. This method is therefore recommended for the production of this species.

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