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## **THE APPLICATION OF PORTABILITY PLANT LANDSCAPE IN CLOTHING DESIGN**

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### **ABSTRACT**

*This paper proposed plant clothing eco-friendly design concept, environmental protection and sustainable development as the perspective, through the miniature plant landscape in the use of clothing components, making the concept of environmental protection intuitively reflected in the costume design. These micro algae seed growing environment can be determined by the methods of experiments, including setting the selection of fabrics, temperature and humidity to ensure that seaweed can grow plants from the cultivation of the fabric out and let the plant formed a natural fabric recycling, enhanced clothing fashionable. Then, the landscape design of the cultivation of the plant fabric can be connected with different shape and clothing ontology. Meanwhile, according to ergonomic principles and clothing components removable design concept, the wearer can switch to a different shape of the plant through its own fabric to match the needs of different styles of clothing, in order to achieve the purpose of portability plant landscape. This study not only created a modern fashion crowd creative way of dressing, but also the clothing itself has a small ecological system to achieve sustainable development. This is also the new design direction in the field of fashion design. Keywords: Portability, Plant Landscape, Clothing Design*



## INTRODUCTION:

With the rapid strengthening of people's awareness of environmental protection, "sustainable development" concept has entered a lot of areas, and spread to the textile and garment industry, consumers of textile quality requirements from the traditional practicality, aesthetics, durability, tend to more Attention to the environmental protection, safety and health, the design of clothing is also more inclined to the performance of comfort, personality, natural style of dress, green clothing began to become the same as the focus of green food consumers. Which have prompted many domestic and foreign scholars and fashion designers began to explore the ecological, clothing, sustainable development and so on the relationship between.

At present, the research on environment-friendly clothing at home and abroad mainly involves the design of sustainable, fiber fabric, dyeing and finishing technology and many other disciplines, such as: China's Wei Yulong proposed low-carbon concept in the modern costume design and use[1]; China's Zhou Wenjie in the "analysis of the green design of clothing" put forward the performance of clothing green design techniques [2]; Gao Ying on the vision of sustainable development under the modern design [3]. The study of environmental protection in the field of textile and garment mainly focuses on the review of clothing materials, comfort clothing styles, clothing colors and other aspects of the review, and textile technology, dyeing and finishing technology research rarely, and direct natural ecosystem grafted to the clothing The design of the study has not been involved.

In this paper, the concept of sustainable plant landscape and clothing is put forward from the perspective of environmental protection and sustainable development. Directly through the use of micro-plant landscape in the use of clothing components, making the concept of environmental protection intuitive reflected in the clothing design, and because it is a direct use of plants

as part of the design of clothing, no extra fiber extraction, processing and other processes, in the design and production Not only will not produce other environmental pollutants, and these plants through the photosynthesis will also bring the local air purification for the wearer. And the selection of plants, places capable of detecting environmental quality and easily cultivated plant miniature low as experimental subjects, Through the experimental way to determine the growth of these micro-plant seed environment, including the choice of fabric, temperature and humidity settings to ensure that plants can grow from the cultivation of fabric, so that plants form a natural fabric texture, and enhance the sense of design clothing. Secondly, cultivated plants fabrics landscape design to form different shapes and clothing body connection. At the same time, according to the principles of ergonomic and detachable design of clothing parts, the wearer can change the different shapes of plant fabric through their own needs to match the different styles of clothing, in order to achieve the purpose of plant landscape portability.

## Plant selection and cultivation

### 1. Can be used directly in the clothing design of plant species

Portable plant landscape design, emphasizing the functional development and development of green clothing to show the natural, respect for nature, the performance of nature for the design of the main goals and starting point, At the same time to ensure that the design of innovation and aesthetics. But the nature of a wide range of plants, plant cultivation in clothing must have the following conditions:

- (1) Small size, easy to cultivate.
- (2) Can detect the wearer around the ecological environment and is conducive to human health
- (3) The growth state of a natural sense of texture.



#### (4) Easy to plant landscaping

According to the above conditions, several kinds of plants can be directly used in garment design, such as lichen, moss and algae. These small green plants has simple structure, and it contains two parts of stem and leaves, some only flat leaves, no real roots and fiber bundles. And it can survive in moist environment and soil conditions, it can be cultivated easliy. Which are for the plant can be applied directly to the clothing design provides a convenient condition.

Lichen, moss, algae, these small green plants have a strong anti-radiation ability. And it still lush growth in mountain areas where radiated by ultraviolet strongly, especially in the wet non-polluted area. But their growth need fresh air, these micro-plants will be destroyed by air pollution. It is very sensitive special plants, when very small amount of toxic substances in air can affect their growth and even death.

According to the literature, the average annual concentration of carbon dioxide to reach  $0.05 \times 10^{-6} \sim 0.105 \times 10^{-6}$  can make lichens disappeared, so it can serve as a good atmospheric pollution monitoring[4]. These plants are directly used in clothing, the wearer can observe the growth of the plants state to monitor the surrounding environmental conditions, which can take timely measures. At the same time these small green plants absorb photosynthesis through carbon dioxide, dust, air purification and anti-radiation function for the wearer to bring the portable small-scale ecosystem to protect health.

These small plants are mostly in the form of flakes and have a beautiful texture. And a wide variety of lichens, mosses, and algae, Different species of plants have different visual sensations. Under different temperature and humidity conditions, these plants are in shape. There

are many changes in color, which are the overall design played a natural decorative role, and makes the concept of environmental protection intuitive reflected in the clothing design.

At the same time in the plant landscape and clothing design, on the one hand to consider the growth of plants on the other hand to consider the plant landscape to meet ergonomic and clothing modeling requirements. Lichen, moss, algae and other small plants such as small roots and leaves of small, easy to fall off, strong adhesion, which are plant landscaping in the clothing structure and shape to provide a favorable condition.

#### **2.The experimental plants - moss**

In this paper, moss as the object of this experiment, bryophyte color to grass green, bud green, yellow and green and other green-based, giving full of vitality, fresh and natural feeling, its growth form to full shop structure, fabric structure is simple, Texture sense, like the fabric in the velvet material (shown in picture 1), high degree of beauty. And moss on the adsorption of exogenous substances strong, easy to react by pollution factors. Therefore, Moss has a high demand for its growth environment once the air is contaminated, moss will appear yellow, discoloration of the state, it can be a good way to detect environment changes, so botanists also known as moss as "air quality detector" [5]. And bryophytes are mostly clustered, dense strains have numerous gaps, not only can play the role of capillary-like water absorption, but also can absorb the dust and harmful particles in the air to achieve the role of clean air. At the same time bryophytes light, loose structure, can ensure that the air convection without interruption, to ensure that the role of transpiration and respiration of the normal breathing. These conditions are conducive to the direct use of plants in the clothing and maintenance [6].



picture 1

## METHOD AND MATERIAL

The bryophytes were used as the experimental objects. In order to realize the application of bryophytes in the design of garments, the growth environment of the bryophytes, the attachable fabrics and the growth state were observed and analyzed, and the experimental process was recorded and cultured.

Bryophytes are a group of small, multicellular green plants that require a certain amount of scattered light or half-yin environment. The most important thing is like a damp environment, especially against drought. The growth environment of the humidity, temperature requirements, in the spring and summer should maintain the relative humidity of 80% or more, the temperature can not be less than 22 °C, and 25 °C ambient temperature is more conducive to the growth of moss [7]. Light condition is another important factor affecting the growth of bryophytes, which is the key to the success of artificial cultivation. Therefore, to improve the propagation efficiency of bryophytes and to realize the value of its cultivation, it is necessary to cultivate moss under the combination of ideal substrate and a certain

astigmatism [7]. At the same time because of the cleanliness of clothing and plant landscape requirements, must take the kind of moss marsh re-transplant and full of cultivation methods, so as to be able to ensure that moss plexus in the re-germination before a higher green coverage [8].

Bryophytes love the humid environment but must have a breathable substrate, so in the actual operation process, The use of porous materials for the cultivation and propagation of bryophytes. Based on the concept of ecological sustainable development. Selection of materials that are harmless to the environment and bryophytes. Taking into account the clothing process is easy to operate and so on, the experiment used Grass cloth (Grass cloth is a kind of ramie with pure hand-made plain weave cloth. The structure of the large gap, good ventilation, heat transfer fast, and more water and wet fast.) as alternative materials.

### Materials and tools required for the experiment:

- (1) moss 3 cups (soil must first wash);
- (2) 2 cups of milk / 2 cups of yogurt (pure yogurt better);



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- (3) water or beer 2 cups;
- (4) 1/2 teaspoon of sugar;

Tools: Juicers, measuring cups, brushes, watering cans

**Experimental steps**

The first step, cleaning bought or picked up the moss, as much as possible to clean the soil.

The second step, in the juicer to add 300g moss, milk or yogurt 200g, beer or water 100ml, 1/2 teaspoon of sugar.

The third step, with a juicer stir even until the paint shows a general viscosity.

The fourth step, the moss juice into the bucket, with a brush dip coated on the cultivation of fabric.

The fifth step, every 2-3 days to cultivate moss fabric on the water, humidity maintained at 80% or more. Record the daily culture status.

**Experimental results**

| Time        | January 20, 2017 - January 28, 2017   | January 31, 2017 - February 7, 2017   | February 8, 2017 - February 15, 2017  | February 16, 2017 - February 25, 2017   | February 16, 2017 - February 25, 2017   |
|-------------|---|---|---|---|---|
| Humidity    | 95%—97%   | 84%—90%   | 90%—94%   | 90%—94%   | 85%—90%   |
| Temperature | 11~18℃  | 15~20℃  | 15~20℃  | 15~25℃  | 15~23℃  |
| Status      | Slow growth   | Growth is slow, but the culture of green germ appeared.                             | There are many moss buds growing out  | Moss buds all grow.   | Moss grows well, buds grow about 1cm high   |
| Picture     |  |  |  |  |  |

According to the experimental results (Table 2): moss in the relative humidity of 90% -94% and the temperature within 15 ~ 25 °C easy to grow in the culture of the fabric, but also found in the absence of soil cultivation in the case of moss growth status is poor, color tend to yellow.

**The plant landscape in the costume design can be implemented**

In the costume design, only consider the practicality, aesthetics clearly can not meet the needs of modern people, the diversity life make the consumer pay more attention to the innovation of clothing. In real life, the practicality of the clothing is often not beautiful, how to maintain the practical performance of clothing in the case of clothing to enhance the creativity of clothing designers are long to explore the direction. Will have a natural texture of the plant landscape directly applied to the clothing, to ensure the practicality of clothing at the

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same time, so that the aesthetic of clothing, art to be greater to enhance. How to properly cultivate a good plant landscape in the design of clothing which should consider the following aspects:

clothing structure and modeling and combined with the concept of transplantable plant landscape, designed with a sense of creativity and fashion of clothing<sup>[9]</sup>. Specific clothing production process shown in Figure 3.

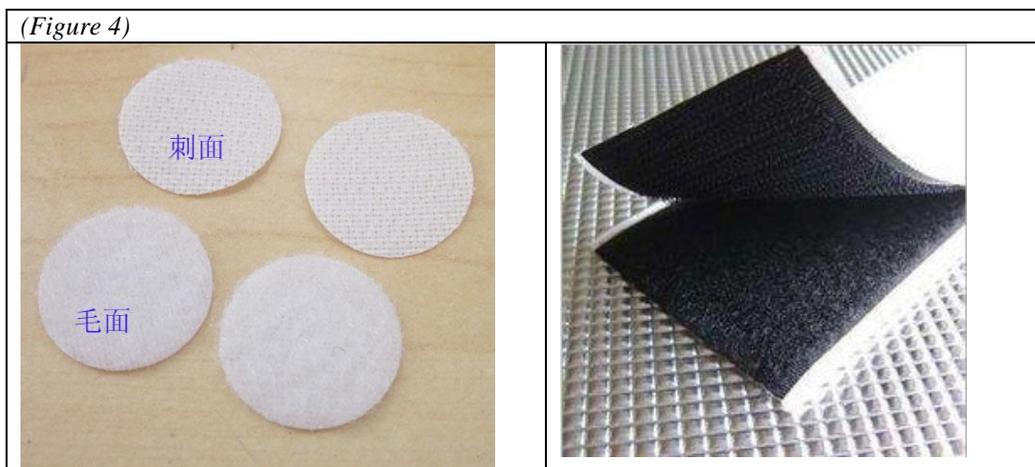
1. According to the modern people's consumer psychology and aesthetic standards, starting from the

| Figure 3  |   |   |
|---|---|---|
|   |   |   |
| Sample production<br>(front film)   | Sample clothing production<br>(rear panel)  | Finished clothing design<br>(front film)  |
|  |  |  |
| Finished clothing design<br>(rear panel)  | Final clothing design<br>(front panel)  | Final clothing design<br>(rear panel)   |

2. plant landscaping not only to ensure that the unique beauty of the clothing and make the plant landscape components meet ergonomic, does not affect the body's normal activities<sup>[10-11]</sup>.

3 Natural plants will be applied to the clothing, to take into account the natural growth of plants, to ensure long-term preservation of plant landscape and can be replaced. This requires plant landscape clothing parts with portability. Combined with the modern clothing market detachable clothing design concept, in the design of portable plant landscape clothing, we will cultivate the plant landscape components according to clothing

styles designed a different shape, so that a clothing can wear clothing to use different styles, so The wearer in the process of transformation is both fun, but also enhance the practicality of clothing. In the specific operation involved in the plant landscape and clothing ontology connection. In ensuring the overall beauty of clothing at the same time to ensure the convenience of clothing removal. In contrast to the zipper, Velcro, decorative buttons, etc. connected to the experiment found: Velcro<sup>[12]</sup> (Figure 4) in the clothing design is not only easy to replace the plant landscape, and will not affect the overall beauty of clothing.



### The conclusion

The use of portable plant landscape in clothing is a new design direction in the field of fashion design, and an exploratory study of the way people wear in the process of harmony between man and nature. This not only creates a modern fashion crowd of creative way of wearing, but also the clothing itself has a small ecological system, truly a people-oriented, concerned about the human and natural environment in harmony with the sustainable development goals.

The main feature of this paper is the plant landscape directly applied to the clothing design, plant cultivation in the fabric is the key technology. Through the literature search, data collection analysis is easy to plant in the plant and plant has been grown with the plant, and through plant cultivation experiments to achieve the combination of plants and clothing. In the experiment, the experimental plant-moss was grown in the culture fabric within 90% -94% relative humidity and within the temperature of 15-25 ° C, but because the color of the



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bryophyte was not in a constant temperature The state is not good, the design has a certain impact. Another detachable connection method is an important means of achieving a portable plant landscape. Through the clothing connection accessories contrast, Velcro in the portable plant landscape clothing design can achieve its concept of portability.

In the next step of the study, plant experiments to carry out constant temperature plant cultivation so that the plant landscape developed more beautiful. But also to expand the field of plant varieties and fabric research, rich in portable plant landscape in the use of clothing.

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