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Plant Diversity that Can be Used as Silk Fabric Ecoprint Material as a Learning Resource Contextual for High School Students

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Abstract: This study aims to find ou what types of local plants can be used as ecoprint materials of Sutra in Tempe District, Wajo and contextuallearning resources for SMA sstudents. Narrativeistic-interpretative This research was carried out from January to April 2023 and the research locations were conducted in Tempe District, Wajo Regency and in High Schools. The data analysis technique was carried out using 3 steps, namely data reduction, data presentation, and drawing conclusions. Based on the results of observations and explorations that have been carried out at the location, there are 10 types of local plants that can be used as ecoprint materials. The shape of the leaves of the ten types of plants is different, some are pinnate, finger and others.

Keywords: plants; ecoprint; silk.

INTRODUCTION

Indonesia is a country that has the highest level of biological wealth, thus making Indonesia one of the world's centers of biodiversity (Suhartini, 2009). One form of utilization of biodiversity is by utilizing plants as natural dyes produced from various types of plants obtained from plant parts such as leaves, stem bark, fruit skin, seeds, roots and flowers. (Berlin et al., 2017). There are approximately 150 types of natural dyes in Indonesia which have been identified and widely used in various industries such as in handicraft commodities such as wood, bamboo, pandanus and batik such as cotton, silk, wool (Husodo, 1999).

Ecoprint is a natural coloring technique by making direct contact between fabric and plant parts that contain color pigments (Efriani *et al*., 2020). This is what causes an *ecoprint* to have exclusive value because even with the same raw materials and processes, the resulting motifs and colors will vary. *Ecoprint* is a product that is currently in great demand by the public and has a very high economic value. Ecoprint materials are plants that have a lot of tannins or in the sense that these plants have a lot of sap so they can produce the desired color . The more water content, the less sharp the result or color, because the large water content makes the viscosity low, which means the results will easily smear (Subiyati et al, 2021).

Ecoprint technique consists of two types, namely techniques in steaming (*Steam*) and techniques in beating *(Pounding*) (Marsudi, 2019). The *pounding* technique is done

by hitting the plant parts that have been arranged on the cloth so that the colors contained in the plant parts can be printed on the cloth (Azahra & Kartikawati, 2022). The plants used are also plants that have a high sensitivity to heat, because this is an important factor in extracting color pigments (Saptutyningsih & Kamiel, 2019). The use of silk in the *ecoprint process* is very influential in the coloring process. Silk is also a material that comes from nature which is easy to obtain and silk also has the capability of being hygroscopic with tensile strength, excellent absorption and heat resistance so that silk is very suitable for ecoprinting (Adelia Chairun Nisa, 2021).

Types of plants that are often used as ecoprint materials are Jatropha Gossypifolia (Jarak Merah), Lannea coromandelica (Jaranan), Terminalia catappa (Ketapang), and Muntingia calabura (Kersen). Plants that are good to use are plants that have color pigments and high humidity (Tiara Intan Cahyaningtyas et al., 2022). Types of plants that can be used as ecoprint materials are plants that have a lot of tannins or in the sense that these plants have a lot of sap so they can produce the desired color. The more water content, the less sharp the result or color, because the highwater content makes the viscosity low, which means the results will easily smear.

Integrating the concept of conservation in learning biology as an effort to foster literacy and environmental awareness for high school students can be done using a contextual approach (Mumpuni, 2013). Local plant bioecology can be applied in various High School materials, including Biodiversity material. Integrating the context of learning materials according to surrounding environmental issues and learning methods that vary widely can make it easier for students to solve environmental problems and form a caring character for the surrounding environment.

Based on this, researchers took the initiative to identify local plant species that could be used as ecoprint materials for Silk Fabrics in Tempe District, Wajo Regency and contextual learning resources for high school students.

METHODS

Research Design

This research is an exploratory research using a qualitative research approach. Qualitative research was conducted using a naturalistic-interpretive paradigm. This means that researchers try to understand reality from a naturalistic perspective, paying close attention to what happens, how you change over time, and how people feel about it. For this type of research, it is important to use content analysis, which is a method of studying communication within a phenomenon (Ahmad, 2018).

The subjects of this study were local plants that can be used as *ecoprint materials* for silk fabrics in Tempe District. Meanwhile, the object of this research is local plants found during the research in Tempe District.

Research Instruments

This research contains primary data and secondary data Primary data is data that will be obtained from the first source either from individuals or individuals such as the results of interviews or the results of filling out questionnaires that are usually carried out by writers or researchers (Husein Umar, 2013: 42). Secondary data is a source of research data that can be obtained by researchers indirectly through intermediary media, namely obtained and recorded by other parties (Husein Umar, 2013: 42). In accordance with these data, this study used three methods, namely the observation method, the documentation method, and the literature study method .

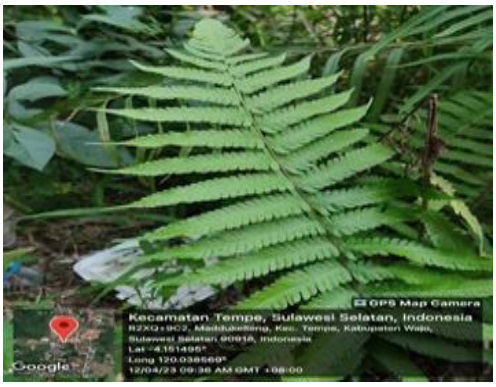
RESULTS AND DISCUSSION

Result of Research Procedure

Diversity of Local Plant Types That Can Be Used as *Ecoprint Materials*

In this study, significant findings can be identified . These findings are local plant species that can be used as ecoprint materials. Based on the results of observations and explorations that have been carried out at the location, there are 10 types of local plants that can be used as *ecoprint materials*, along with the plants:

1. *Amauropelta noveboracensis* (ferns)

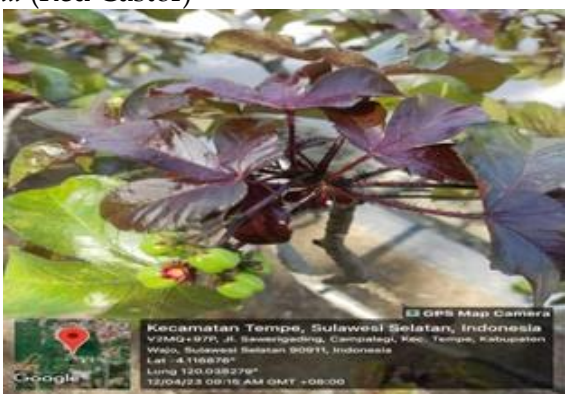


Kingdom : Plantae
Division : Pteridophyta
Class : Pteridopsida
Order : Polypodiales
Family : Davalliaceae
Genus : Davallia
Species : *Davallia denticulata* _

This plant is found on Jl. Puangrimaggalatung behind building B of Puangrimaggalatung University. Davallia fern (*Davallia denticulata*) or fern is one of the plant divisions of Pteridophyta in which each species has a cortex because it has true roots, stems and leaves and has vascular bundles namely xylem and phloem. These plants can be found in moist environments (hygrophytes), in various places in water (hydrophytes), and attached (epiphytes) to rock surfaces, soil and trees (Ulfa, 2017).

However, the existing *davallia fern species are hygrophytic.* This plant prefers high places. Ferns can reach several meters high, such as those found in the genera Cyathea and Alsophila (Tjitrosoepomo, 2011). The leaves are pinnate. The following are the results of *the Ecoprint Amauropelta Noveboracensis*

2. *Jatropha Gossypifolia* (Red Castor)



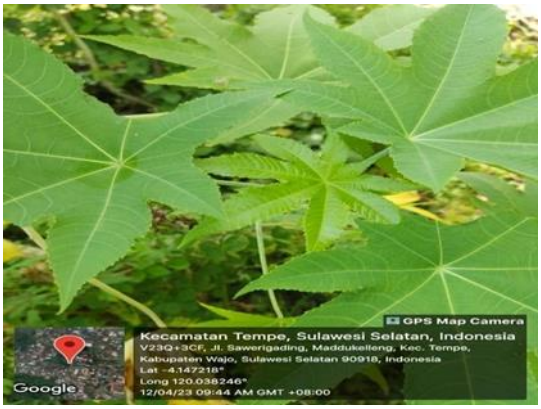
Kingdom : *Plantae*
Division : Angiosperms
Class : Dicotyledoneae
Order : Eupobisles (Tricare)
Family : Euphorbiaceae
Genus : Jatropha
Spesies: *Jatropha Gossypifolia*

This plant is found on the edge of Jl. Sawerigading which is adjacent to the Cempalagi market. Jatropha gossypifolia (*Jatropha gossypifolia*) belongs to the group of plants with incomplete leaves. This is because the leaves are *orbicularis* (round). Has *intervenium* (leaf flesh) which is thin soft (*herbaceus*), serrated leaf edges, tapered leaf tips (*acuminatus*). Karan at the meeting point of the two edges of the leaf is much higher than the pointed tip of the leaf (*acutus*), and the tip of the leaf looks narrow, elongated and pointed. Leaves alternately arranged (4.5–10 cm long and 5–13 cm broad) having three or five lobes and an arrangement of radial veins. The leaves are purplish and glandular covered, but usually turn bright green as the plant ages. The pointed tip of the leaf is on the petiole, 6-9 cm long, all parts of the leaf are covered with glandular (Silva *et al* , 2014).

The following is the result of the *Jatropha Gossypifolia ecoprint*

Source: Personal document

3. *Ricinus Communis* (Distance)



Source: Personal document

Kingdom : Plantae
Division : Tracheophyta
Class : Dicotyledoneae
Order : Malpighiales
Family : Euphorbiaceae
Genus : Ricinus
Species : *R. Communis*

This plant is found on the side of the road, namely Jl. Andi Unru. The benefits of the jatropha plant have been known and used in daily life since more than 4,000 years ago. Jatropha is a shrub or small tree with a height of 1-5 meters. This plant has stems that are round or cylindrical, smooth, hollow, jelly-book with signs of loose leaf stalks and the whole stem is reddish green. If the stem is injured, it will emit a white sap that is thick and slightly cloudy. Jatropha leaves are heart-shaped or ovoid wide with a length and width of about 5-15 cm. The leaf blade is incised, notched with an angle of 3 or 5. The base of the leaf is grooved and the tip is tapered. Finger leaf bones with 7-9 main bones. Petiole long, about 4-15 cm (Crpnquist, 1981). Jatropha leaves are single leaves with alternating leaf growth, round leaf shape with a diameter of 10-40 cm, 7-9 fingers, sharp leaf tips with jagged edges. young. The leaf stalks are long, red-green in color and the leaf bones are fingernails (Pambudi, KW, et al., 2014).

Here are the results of *the ecoprint Ricinus Communis*

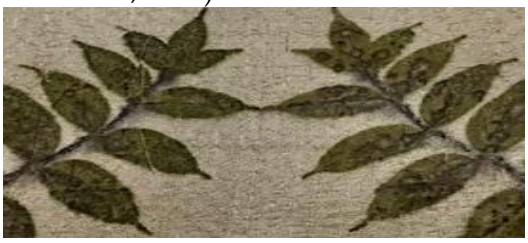

Source: Personal document

4. Lannea coromandelica (Jaranan)

Source: Personal document

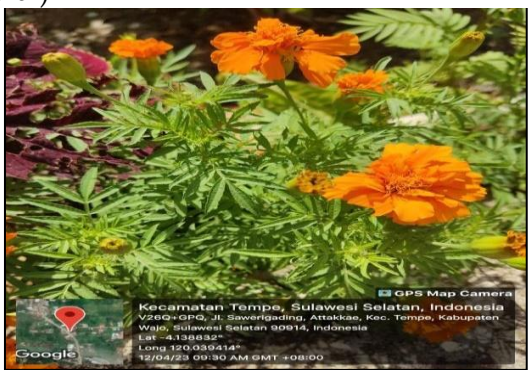
Kingdom : Plantae
Division : Tracheophyta
Class : Magnolyobside
Order : Sapindales
Family : Anacardiaceae
Genus : Lannea
Species : Lannea coromandelica

This plant is found on the side of the road in lane two of Sawerigading in front of the car wash. Jaranan is a tropical plant with a height of 15-20 meters and is widespread in several tropical countries including Indonesia. This plant is known by various names, such as in Java it is called the kudo tree, jaranan, ki kudo, kedondong male, in Flores it is called the reo tree, in South Sulawesi, especially the Bugis people, it is known as "aju tammate" which means it does not die, because it is easy to grow. once grown, even during the dry season (Rahayu et al., 2005). odd pinnate compound shape, leaflets opposite, leaf veins pinnate; leaf diameter 4.4 - 5.0 cm; leaf length 7.3 - 10.5 cm; petiole length 0.3 - 0.8 cm, leaf shape oval, and pointed leaf tip. Tree trunks usually secrete gum when injured (Nurul Eskani et al., 2017).



Source: Personal document

5. *Tagetes erecta* (Marigold)



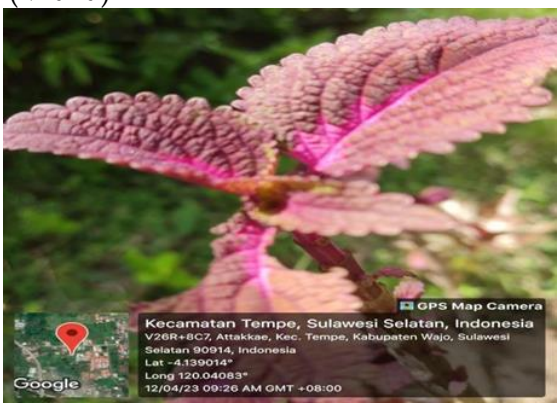
Source: Personal document

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Asterales
Family : Asteraceae
Genus : Tegates
Species : Tagetes erecta L.

This plant is found on Jl. Sawerigading is right in front of the residents' houses. Marigold flowers (Tagetes earta L.) are currently widely cultivated in Indonesia, especially on the island of Bali. Marigold is an annual plant that can grow in fertile soil with a neutral pH, in hot areas to mountainous areas where there is enough sunlight and has good drainage. Marigold plants grow upright with branching stems 50-100 cm high, have pinnate dark green leaves, taproot with root hairs, and reproduce by seed. On the entire stem, compound leaves grow with sharp ends and jagged edges. Marigold flowers 7-10 cm in diameter with a double flower crown arrangement, brightly colored, namely yellow, orange, or double colored. The yellow color of Marigold flowers is caused by two main pigments, namely carotenoid pigments and a small proportion of flavonoids. Carotenoids in Marigold petals are 200 times more than carotenoids in corn (Chitrakar, et al, 2019).

Source: Personal document

6. *Coleus atropurpureus* (Miana)



Source: Personal document

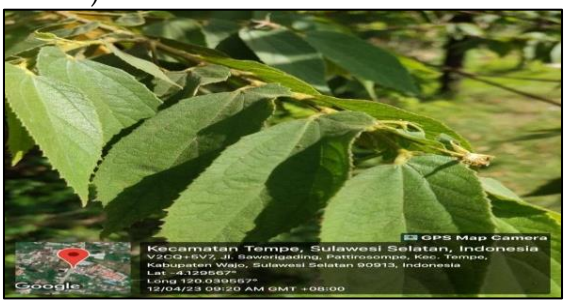
Kingdom : Plantae
Division : Spermatophyta
Class : Dicotyledoneae
Order : Lamiales

Family : Lamiaceae
Genus : Coleus
Species : *Coleus atropurpureus*

This plant is found in the yard of a resident's house at the entrance to BTN La Tenri Dolong. *Coleus atropurpureus* is a shrub with a height of up to 1.5 m and grows in a slightly moist or slightly watery environment. The leaves are purplish-red and 5-15 cm in size. Miana plants grow wild in fields or gardens as ornamental plants. Usually cultivated by cuttings in approximately two to three weeks. The bones are pinnate with a length of 7-11 cm, a width of 5-7 cm, a stalk length of ± 3 cm and a purple color. This plant has other names, namely *sigresing* (Batak), *adong-adong* (Palembang), *jawek kotok* (Sundanese), *iler* (Central Java), *ati-ati* (Bugis) and *sarewung* (Minahasa) (Badrunasar and Budi, 2017).

Source: Personal document

7. *Muntingia calabura* (Cersen)



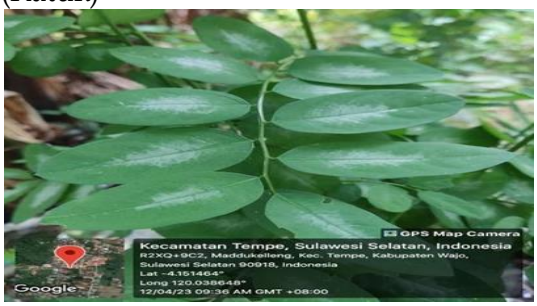
Kingdom : Plantae
Division : Spermatophyta
Class : Dicotyledoneae
Order : Malvales
Family : Elaeocarpaceae
Genus : Muntingia
Species: *Muntingia calabura* L.

This plant was found at BTN Nusa Idaman Blok.C1. Kersen tree (Muntingia calabura), is a neotropical type plant, which is a type of plant that grows well in tropical areas such as Indonesia. The cherry plant originates from the Philippines and was reported to have entered Indonesia in the late 19th century. The tree is between 3 and 12 meters high, grows and bears fruit all year round on fan-like branches, the branches are horizontal, hanging towards the ends, with fine hairs. The leaves are single, egg-shaped to lanceolate, 4-14 cm long and 1-4 cm wide with a markedly asymmetrical base, serrated edges, gray hairy underside (Rosandari et al, 2015).

The cherry plant begins to flower at the age of two years, the flowers grow from one to five florets, located on one floret in a bundle that is located supra-axillary from the leaf, are bisexual. The petals are five in number and white, in one bundle the number of stamens increases from 10-25 in the first appearing flowers to more than 100 in the last appearing flowers. Flowers bloom just before dawn and last only one day (Rosandari et al, 2015).

Source: Personal document

8. *Sauropus androgynus* (Katuk)

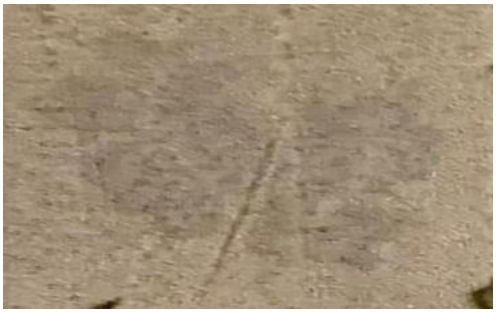


Kingdom : Plantae
Division : Spermatophyta
Class : Dicotyledonae
Order : Euphorbiales
Family : Euphorbiaceae
Genus : Sauropus
Species: *Sauropus androgynus* (L.)

This plant is found on Jl. Puangrimaggalatung is right behind building B of Puangrimaggalatung University. The katuk plant (*Sauropus androgynus*) is known as *star gooseberry* or *sweet leaf (English), mani cai (China), rau ngot (Vietnam), sweet claw or sweet vegetable (Malaysia).* In Minangkabau it is called simani, and in Java it is katuk, katuk or babing. Madurese people call it kramur and in Bali it is better known as cinnamon (Agoes, 2010).

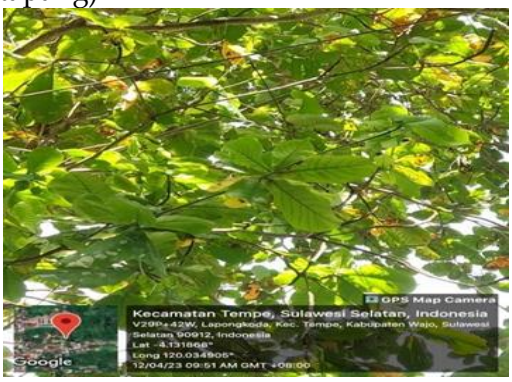
Katuk leaves are single, stemmed 3-5 mm long with leaf blades that are elongated round or egg-shaped to oval. Has a length of 2-4 cm; width 1.5-2.5 cm; the tip and base of the leaves are tapered, the edges of the leaves are flat; upper lower surface green to brownish green; leaf veins clearly prominent on the lower surface.

This plant is very popular in South Asia or Southeast Asia, thrives up to 2.5 m with dark green ovals up to 5-6 cm long. The top of the plant is also called *tropical asparagus*. In Vietnam it is a mixed seasoning for crab meat, pork or dried shrimp which is used as soup. Meanwhile, in Malaysia, it is mixed with eggs to make an omelette (Angeos, 2010).



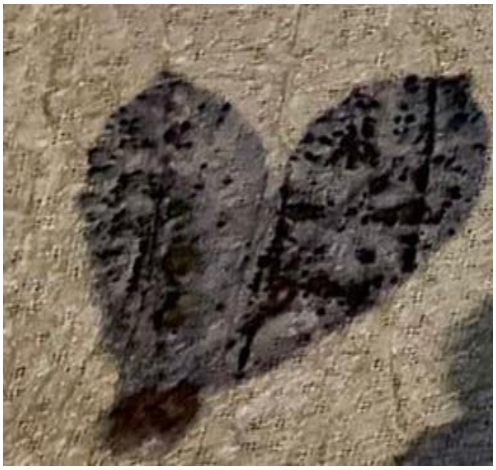
Source: Personal document

9. *Terminalia catappa* **(**Ketapang)



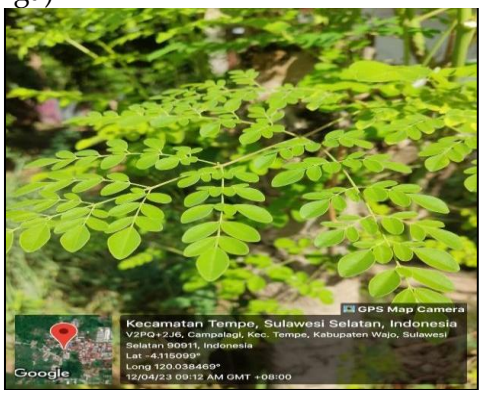
Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Ordo : Myrtales
Family : Combretaceae
Genus : Terminalia
Spesies: *Terminalia catappa* L.

This plant was found on Jl. Sandalwood inside the UPT SMA Negeri 7 Wajo school. Plant *Terminalia catappa* L. It has a shady stem with branches that grow horizontally and in tiers. The leaves, most of them running at the ends of the branches, are short-stalked or almost sitting. Leaves are ovate inverted, 8-38 cm long and 5-19 cm wide, with tips wide and narrow base, leaves at the base are heart-shaped, on the lower side of the base of the leaf there are glands on the left and right of the mother of the leaf bone, the upper surface is smooth and the lower part is finely hairy, reddish in color if it falls off. The flowers are small, collected in spikes near the ends of the branches, 4 - 8 cm long. The fruit is oval, flat, square or narrow-winged (Syamsuhidayat, *et al*, 2018). It has a height of up to 40 m with gray to brownish gray trunks. The leaves have a round blunt tip, shiny, rough, and dark green in color which will later turn yellow and red when they fall, the fallen ketapang leaves have anti-bacterial activation (Alfaida, 2013).



Source: Personal document

10. *Moringa oleifera* (Moringa)



Source: Personal document

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Myrtales
Family : Moringaceae
Genus : Moringa
Species : *Moringa oleifera Lam*

T

his plant is found in BTN NUSA IDAMAN Blok.B. Moringa plant (*Moringa oleifera*) is a tropical plant that is easy to grow in tropical areas such as Indonesia and various other tropical regions in the world. Moringa plant is a plant with a height of 7-11 meters. This plant is a shrub or tree with strong, long-lived roots, brittle woody stems (breaks easily), erect, dirty white, thin skin, rough surface, and rarely branches (Hariana, 2008).

Moringa leaves are oval in shape with flat leaf edges and are small in compound arrangement on one stalk (Tilong, 2012). There are several nicknames for the Moringa tree including *The Miracle Tree*, *Tree For Life*, and *Amazing Tree*. The nickname arose because the parts of the Moringa tree, starting from leaves, fruit, seeds, flowers, bark, stems, to roots, have extraordinary benefits. Moringa plants are able to live in various types of soil, do not require intensive care, are resistant to dry seasons, and are easy to breed (Simbolon *et al* , 2007).

Source: Personal document

Based on the ten types of plants mentioned above, there are four types of plants that are highly recommended by researchers to be used as *ecoprint* materials, namely red jatropha, cherry, ketapang, and jaranan. In addition to their very attractive shapes, these four types of plants also emit very perfect colors, so researchers recommend these plants as *ecoprint materials*. Several factors related to natural leaf color include substances contained, leaf character, leaf position on the leaf stem, different sun lighting and seasons (rainy or hot) (Arif & Wardatul Firdaus, 2019) .

Integration of Ecoprint Exploration Results as Silk Fabric Ecoprint Materials as a Contextual Learning Resource for High School Students

ecoprint exploration results refers to biodiversity material in senior high schools. The *ecoprint* technique is an alternative that can be used by biology teachers as material development to achieve indicators in learning. In addition, with ecoprint students can create products based on local wisdom using silk fabrics and utilizing the types of leaves that exist in their surroundings. As well as being able to train students to train skills that can be used in the economic sector of society. Learning natural sciences really needs to be given to students, of course, because learning science gives students the opportunity to cultivate curiosity naturally, develop the ability to ask questions and find answers to natural phenomena based on evidence, and develop a scientific way of thinking (Setyaningrum, F. & Purwanti, S., 2020).

CONCLUSION

Based on the results of research related to local plant species as *ecoprint materials* on silk fabrics in Tempe District. It was concluded that there were ten types of plants that were selected and appropriate as ecoprint materials and had been tested, the types of plants were (1) jaranan, (2) kelor, (3) miana, (4) jatropha, (5) red jatropha, (6) marigold, (7) ketapang, (8) kersen, (9) nail leaves, and (10) katuk.

The linkages between the results of research on plant species for *ecoprint materials* refer to biodiversity material in biology lessons in high schools. Thus, it can be said that the results of this study can be used as a contextual learning resource for high school students as well as material for developing material related to basic competencies in analyzing various levels of biodiversity in Indonesia and its threats and conservation, and indicators of achievement, namely creating products that benefit existing biodiversity. in the neighborhood.

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