Identification of acem acem leaves as hand washing media for pesticide user

E L Mahyuni*
Department of Occupational Safety and Health, Faculty of Public Health, Universitas Sumatera Utara, Medan, North Sumatra 20155, Indonesia

*E-mail: eka.lestari@usu.ac.id

Abstract. To replace the unavailability of water and soap in the fields, Karo farmers use a type of wild plant known as “daun acem acem” to clean their hands that are exposed to pesticides. This study aims to identify wild plant species that were carried out on horticultural farms that were used by farmers to clean the pesticide exposure. The research location is in Sumber Mufakat village, Kabanjahe district, Karo district in 2019-2020. This is a descriptive survey where the leaf as samples were taken by making observation plots measuring 1mx1m and placing them at random research locations in 20 farmer fields. The data analyzed in descriptive by compare and tracing in exploration. The result found that acem acem leaves have a leaf shape like clover and have flowers. Generally grows wild around plants that contain lots of water. This plant also contains water, especially in the stems and roots. This mountain clover is included in the genus oxalis and the species Oxalis dehradunensis Raizada. Farmers are sure that these leaves are effective in cleaning the pesticides at the skin exposure. This plant contains saponins, flavonoids, polyphenols, tannins, and oxalic acid and is effective to increase the personal hygiene of farmers.

1. Introduction
The dynamics of the agricultural sector caused losses related to environmental damage, poisoning, disease, and death, even economic injustice and social inequality. This phenomenon leads agriculture to become a system that survives to the next generation with the concept of sustainable agriculture. Sustainable agriculture in achieving sustainable development is very important because agriculture is the largest contributor to climate change, meeting food needs and developing agriculture comprehensively, and improving farmers’ welfare through agricultural production increases. An ecologically sustainable system with a long-term sustainable ecosystem carrying capacity by minimizing the occurrence of environmental damage is an effort to utilize and manage natural resources in a sustainable manner and does not harm the environment. Sustainable agriculture can be achieved by protecting, recycling, replacing, and maintaining the Natural Resources and biodiversity base that contributes to the protection of natural capital [1-4].

Agriculture in Indonesia will not be separated from the pesticides used on Plant Pest Organisms (PPO) which can reduce agricultural productivity. One of the pests that are always around agricultural land is wild plants (weeds). Weeds are plants that are easy to grow in different places, from nutrient-poor places to nutrient-rich places. The presence of weeds in high populations needs to be controlled and requires farmers to use pesticides in high frequency. Excessive pesticides use and not according to procedures has always been a trigger for acute and chronic exposure to pesticide poisoning and many occur in developing countries [5-8].
Karo Regency is one of the regions plateaux in North Sumatra and the majority of the population work as farmers. Karo farmers generally use pesticides freely as needed without strict supervision. Pesticide exposure through the skin is often experienced because of the non-use of personal protective equipment while applying pesticides. One of the prevention efforts in the application of pesticides is to clean yourself after spraying pesticides. The habit of washing hands or cleaning themselves after applying pesticides is a concept to improve the personal hygiene of farmers. Poor personal hygiene is a factor that significant in causing poisoning role and even causing diseases related to skin disorders. Farmers are always encouraged to take a shower or wash their hands and body parts that have been splashed with pesticides. However, the unavailability of water and soap in the fields makes farmers rarely wash their hands and carry out hand washing or bathing activities after they finish farming. In general, male farmers have a better knowledge of pesticide use and greater awareness of associated health risks than female farmers. The knowledge of pesticides impacts, pesticide use practices, and protective behaviors is generally good but in practices it is often ignored. The knowledge of farmers on personal hygiene and sanitation is very good, but the act of washing hands or showering after spraying pesticide is still weak [9-16].

Based on the results of the study, to replace the role of the unavailability of water and soap in the fields, Karo farmers use a type of wild plant (weed) known as "daun acem acem". Farmers often use this plant as a substitute for water and soap to clean hands that are exposed to dirt or pesticides. This simple method has become a hereditary habit. This wild plant is also very commonly found around farmers' fields and has several different colors of flowers [17].

This study aims to identify and analyze the types of weeds that are used by farmers as a medium for washing hands to improve the personal hygiene of farmers.

2. Method
This research is to identify wild plant species (weeds) was carried out on horticultural farms. The research location is in Sumber Mufakat village, Kabanjahe district, Karo district in 2019-2020. The leaf found on the land in the wild and sometimes throw away by farmers cause the habit to decrease the water intake for the plant produce. The method used is a descriptive survey. Leaf samples were taken by making observation plots measuring 1mx1m and placing them at random research locations in 20 farmer fields. The data was analyzed in descriptive by comparing and tracing the characteristics and functions of acem acem leaves needs in literature exploration systematically. The characteristic of leaves will analyze to know the kind of leaf and explore in biology literature systematic that divided into plant leaf type and plant flower type to found the species of the leaf. This research also elaborates the species function and explores the systematic review.

3. Results and Discussion
Indonesia's tropical nature is fertile land for the growth and development of various vegetation including weeds or wild plants. Weeds are often directly or indirectly an enemy or a nuisance to the main crop being cultivated and usually grow at the end of the cultivation period. Weeds are not only harmful but behind their nature weeds have many benefits for human health. Weed species are also affected by plant density, soil fertility, cultivation, and tillage patterns [17].

Tanah Karo is a highland area where there is a lot of agriculture because the people's livelihood is also dominated by farmers. The results showed that there was one weed known as acem acem leaf by the Karo farming community. The leaves include plants that often grow around plants and seem like wild plants (weeds). This plant also spreads quickly with a leaf shape similar to clover. Acem acem leaves are usually allowed to grow wild naturally and are occasionally pulled out as part of clearing the fields. The name of acem acem from this leaf comes from the sour taste of the leaves which have also been consumed by the public, so the community is called by the name of acem-acem leaves.

Based on the results of the identification of wild plants (weeds) and scientific investigations, the acem acem leaves have a leaf shape like clover and have flowers. Generally grows wild around plants
that contain lots of water. This plant also contains water, especially in the stems and roots. The identification results indicate that the mountain clover is included in the genus *Oxalis*.

| Plant species          | Plant leaf type                                      | Plant flower                                               |
|------------------------|------------------------------------------------------|------------------------------------------------------------|
| Oxalis acetosella      | Heart-shaped fold in the middle (clover)             | Small white chasmogamous with pink stripes                 |
| Oxalis adenophylla     | The heart shape closes to the middle and is a little thick | Purple white striped purple                               |
| Oxalis albicans        | Folded heart in the middle                           | Yellow striped                                             |
| Oxalis alpine          | Heart-shaped fold in the middle (clover)             | White with fine lines with yellow streaks                  |
| Oxalis ambiguus        | Heart-shaped and wrinkled at the edges and has red spots | White and like a trumpet                                   |
| Oxalis articulata      | Heart-shaped fold in the middle (clover)             | Dark pink flowers with long stems                          |
| Oxalis barrelieri      | Long and bony fins                                   | White flowers with long stalks                             |
| Oxalis bowiei          | Heart-shaped and circular                            | Pink flowers and fibrous and long stems                    |
| Oxalis brasiliensis    | Heart-shaped fold in the middle (clover)             | Pink flowers like a crown that sticks out long             |
| Oxalis caerulea        | Heart-shaped fold in the middle (clover)             | Reddish blue flowers                                       |
| Oxalis caprina         | Heart-shaped fold in the middle (clover)             | Yellowish white flowers like a trumpet                     |
| Oxalis corniculata     | Heart-shaped fold in the middle (clover)             | Striped yellow flowers                                     |
| Oxalis debilis Kunth   | Heart-shaped fold in the middle (clover) and a little thick | Light purple flowers and white stripes                     |
| Oxalis dehradunensis   | Heart-shaped fold in the middle (clover) like a butterfly | Easy bright purple flowers                                |
| Oxalis depression      | Heart-shaped fold in the middle (clover) and close to the middle | Bright purple flowers and the petals open wide and fold down |
| Oxalis dichondrifolia  | Heart-shaped fold in the middle (clover)             | Yellow flowers with long stalks and close like a trumpet   |
| Oxalis dillenii Jacquin| Heart-shaped fold in the middle (clover)             | Small green flowers like trumpets falling face down        |
| Oxalis ecuadorensis    | Heart-shaped arranged in two lengthwise like fish fins | The dominant white flower is purplish with purple stripes |
| Oxalis enneaphylla     | Heart shape that is close to the outside and resembles a flower | Yellow flowers with long stalks and close like a trumpet   |
| Oxalis exilis          | Heart shaped folded in the middle (clover) with a little hairy | Yellow flower                                             |
| Oxalis gigantean       | The heart-shaped fold in the middle (clover) is green and thick | Yellow flowers and grows on the stem of the host           |
| Oxalis glabra          | Heart-shaped fold in the middle (clover)             | Purple flowers with a yellow                               |
middle (clover) flower base and resembles a threaded trumpet

*Oxalis grandis* Heart-shaped fold in the middle (clover) Small yellow flowers with white stripes

*Oxalis griffithii* Heart-shaped and multi-boned with a thick green color with a slight wrinkle Small white flowers with reddish stripes

*Oxalis hedysaroides* Heart shaped with reddish leaves Flowers with a reddish purple color because it grows by following the direction of the sun

*Oxalis illinoensis* Folded heart-shaped in the middle (clover) widened, sometimes accompanied by white spots Yellow flowers with reddish stripes that accumulate in the flower series

*Oxalis inaequalis* A succulent with petals that resemble other oxalis Yellow and copper flowers, not the same from one flower to another

*Oxalis incarnata* Folded heart shaped in the middle White flowers with reddish stripes and usually grows on shrubs with woody fiber hosts

*Oxalis lasiandra* Leaves are long and oval at the base with 5-6 petals resembling a flower White-pink flowers with long, clustered stalks

*Oxalis latifolia* Folded heart in the middle (clover) like a butterfly with hard and sharp lines Flowers light purple whitish and small, almost like oxalis dehradunensis

*Oxalis luteola* Clover shaped with round petals Yellow flowers with reddish brown stripes

*Oxalis Magellanica* Heart shaped like a clover Not blooming

*Oxalis magnifica* Elongated (elliptical) in shape and has a diameter Small purplish pink flowers with long stems

*Oxalis massoniana* The shape of the heart is oval and elongated like an ellipse and small Small reddish-orange and yellowish flowers piled up

*Oxalis melanosticta* The shape is round like a heart and it closes towards the flower Yellow flowers with reddish lines and flowers in leaf buds

*Oxalis micrantha* Heart shaped folded in the middle (clover) and slightly hairy Yellow flowers with reddish yellow stripes

*Oxalis montana* Heart-shaped fold in the middle (clover) White flowers with purplish-pink stripes with budding petals

*Oxalis norlindiana* Heart-shaped and rounded (clover) Purplish pink flowers with a yellow base

*Oxalis obliquifolia* Heart-shaped fold in the middle (clover) White flowers with reddish brown stripes

*Oxalis ortgiersii* Shaped like a butterfly with long, oval leaves that are dark green in color and the Small yellow flowers with long stems and trumpet-like flowers
underside of the leaves is dark red

**Oxalis pennelliana**
- Heart-shaped fold in the middle (clover)
- Small yellow flowers and elongated in the fibrous part of the clover stem

**Oxalis pes caprae**
- Heart-shaped fold in the middle (clover)
- Yellow flowers with a greenish stripe at the base

**Oxalis priceae**
- Heart-shaped fold in the middle (clover)
- Yellow flowers with long stalks pointing towards the sun

**Oxalis purpurea L**
- Heart-shaped folded in the middle (clover) but rounded on top like a fan or purpura
- Purplish pink flowers with twisted petals

**Oxalis radicosa**
- Heart-shaped fold in the middle (clover)
- Yellow flowers similar to *O. carniculata*

**Oxalis regnelli**
- Heart shaped like a black butterfly with dark purple spots
- White flowers with long and small stalks

**Oxalis repens**
- Folded heart in the middle (clover) with purplish leaves
- Yellow flowers with yellow stripes like *O. carniculata*

**Oxalis rubra**
- Folded heart in the middle (clover) is green
- Whitish purple flowers with a reddish streak. Descendants of the species *O. articulata*

**Oxalis rufescens**
- Heart-shaped fold in the middle (clover)
- White flowers with reddish stripes

**Oxalis schaeferi**
- Heart-shaped fold in the middle (clover)
- Purple flowers with brown stripes

**Oxalis spiralis**
- Folded heart in the middle (clover) is green
- Yellow flowers with reddish stripes and long reddish stems

**Oxalis stricta**
- The heart-shaped fold in the middle (clover) is green and closes
- Yellow in color with small elongated green stems

**Oxalis suksdorfii**
- Heart shaped fold in the middle (clover) slightly hairy
- Yellow flowers with a hard reddish stripe

**Oxalis tenuifolia**
- Shaped like a pine/fir line
- Small flowers with white color with a red border heart, shaped like a trumpet

**Oxalis tetraphylla**
- Heart-shaped folded in the middle (clover) with a purple spot in the middle, usually has four petals which is considered auspicious
- Small flowers with yellow but rarely more dominant in fast spreading leaf growth

**Oxalis triangularis**
- Butterfly shape with blackish purple leaves that spread like butterfly wings
- Small white flowers

**Oxalis tuberosa**
- It has no leaves and grows underground
- Tube-shaped or like larvae without flowers

**Oxalis valdiviensis**
- Heart-shaped and rounded surface
- Yellow in color with a hard reddish line, wide and rounded petals

**Oxalis virginea**
- Long and oval shaped like a cactus, white hairs with
- White flowers with yellowish fine lines
Based on the identification exploration of the wild plants (weeds), acem acem leaves are a type of wild plant belonging to the species oxalis with the genus oxalis dehradunensis Raizada. Farmers often use this plant as a substitute for water and soap as well as a cleaning medium to clean hands contaminated with soil dirt and pesticides. Farmers are sure of the cleanliness of these leaves by rubbing the acem-acem plants with a little rainwater that is accommodated. All dirt and even pesticides that are sticky on the hands can be cleaned as usual. This plant belongs to the type of mountain clover which contains saponins, flavonoids, polyphenols, tannins, and oxalic acid [19]. This content shows that acem acem contains cleaning agents that can be used as soap and are also assumed to be an antioxidant. Oxalic acid contained in this plant will be toxic when consumed in large doses because it is toxic and causes kidney stones and poisoning. However, this oxalic acid can be used as an insecticide against caterpillars [20].

Some types of acem acem leaves that grow have yellow and pink flowers. The leaves of this acem acem grow a lot around horticultural plants and consist of two types, namely acem acem with pink flowers and broad leaves and yellow-flowered acem acem with small leaves. The habit of washing hands by utilizing local potential, namely the acem acem leaves, is already known to farmers and can help farmers reduce residual soil dirt or fertilizers and pesticides after use. Its means this leaf has a great function to reduce pesticide toxicity among farmers. Several weeds have been widely processed and have the potential to provide benefits to human health, including Anting-anting (Acalypha indica L); Babadotan (Ageratum conyzoides (L.; Belimbing Tanah (Oxalis barrelieri L.; Daun Kahitutan (Paederia scandens (Lour.) Merr) and; Jawer Kotok (Coleus scutellarioides (L.) Benth) [21]. But it is undeniable that there are also wild plants that cannot be consumed. It is different with acem acem benefit.

Wild plants that grow in mountainous areas are mountain clover which belongs to the family Oxalidaceae and genus Oxalis. There are approximately 50 species of the genus Oxalis and are scattered in various parts of the world. The most famous type of oxalis is the shamrock or famous in the name of wood sorrell. Not all types of oxalis are wild plants, but there are also types of oxalis that function as ornamental plants. With leaves shaped like a butterfly, this type of oxalis is also often called the love plant or butterfly flower, namely the species oxalis triangularis. This type of plant is also known in the Java area as small tamarind leaves, namely the species oxalis corniculata Linnaeus but has reddish-pink leaves.

Based on the characteristics of the acem acem leaf with a green leaf shape like a butterfly, growing on the ground and having flowers, it was found that the acem acem leaf is a genus of oxalis and a species of Oxalis dehradunensis Raizada. The kind of annual mother with a height of 10-40 cm. There are still many who do not know this type which is known by Karo farmers as acem acem leaves. Similar species include Oxalis corniculata L. leaves containing flavonoids, <1% tannins, steroids/triterpenoids, and oxalic acid.
The pesticides used requires farmers to pay attention to personal hygiene by getting used to washing hands and cleaning equipment and bathing. But farmers often delay maintaining personal hygiene and do it after the work in the fields is finished. As a result, pesticide exposure is unavoidable. There is no water available in the fields. This *acem acem* leaf is believed that the farmers can clean the pesticide dirt that is exposed to the skin of the hands and feet. The unavailability of water in the fields does not bother farmers to clean themselves after spraying pesticides because farmers can use a type of wild plant that grows in the fields. The use of *acem acem* leaves is enough by giving a little water and rubbing the hands thoroughly and all residual pesticides will disappear, clean, and safe.
Figure 2. The benefit of acem acem leaves as media of handwashing to decrease the pesticide exposure at farmer’s skin

4. Conclusion
Wild plants that are often used by farmers as a medium for washing hands to replace the function of water and soap are acem acem leaves with species *Oxalis dehradunensis Raizada*. This leaf is classified as a wild plant type of mountain clover with heart-shaped leaves with a line in the middle and has purple and yellow flowers. This type of oxalis can be consumed because of its sour taste and contains antioxidants, flavonoids, saponins, tannins, and oxalic acid. It has the benefit to clean up the pesticide as the medium of farmer’s handwashing attitude that increases personal hygiene of farmers to remove the pesticide exposure.

Acknowledgment
We thank Mr. Ferry Sembiring for introducing the local potential of Tanah Karo's natural resources and the benefits of this weed leaf as a leaf that can clean pesticides. We said thanks also to all the farmer community who contributed to this research.

References
[1] https://pertanian.pontianakkota.go.id/artikel/29-bersahabat-dengan-lingkungan-melalui-pertanian-berkelanjutan.html
[2] Fadlina I M, Supriyono B and Soeaidy S 2013 *J-Pal* 4 43
[3] Kementerian PPN/BAPPENAS 2020 *Pedoman Teknis Penyusunan Rencana Aksi Tujuan Pembangunan Berkelanjutan (Tpb)/Sustainable Development Goals (SDGs).* Vol. 53, *Pedoman Teknis Penyusunan Rencana Aksi - Edisi II Tujuan Pembangunan Berkelanjutan/Sustainable DEVELOPMENT GOALS (TPB/SDGs)* (Jakarta: BAPPENAS)
[4] Keraf S 2006 *Etika Lingkungan* (Jakarta: KOMPAS)
[5] Ambarwati E and Prapto Y 2003 *J Ilmu Pertan* 2003 10 1
[6] Roberts J R and Reigart J R 2013 *Environmental Protection Agency (EPA)* 54 39
[7] World Health Organization 2021 Managing pesticides in agriculture and public health: a compendium of FAO and WHO guidelines and other resources.
[8] Mahyuni E L, Harahap H R, Harahap U and Nurmaini 2020 *Open Access Maced J Med Sci* 8 341
[9] Budiawan A R 2014 Unnes J Public Heal 31
[10] Hamidah T and Suhartono S 2018 J Kesehat Masy 6 354
[11] Lai W 2017 Environ Econ Manage 86 93
[12] Mahyuni E and Sinaga M 2016 Advances in Health Sciences Research 1 285
[13] Ohayo-Mitoko G J A, Kromhout H, Karumba P N and Boleij J S M 1999 Ann Occup Hyg 43 519
[14] Ranjan R, Neupane K, Wantamutte A S, Banjade B, Kushwaha N and Neupane R 2014 Int J Interdiscip Multidiscip Stud 1 202
[15] Riccò M, Vezzosi L and Gualerzi G 2018 J Prev Med Hyg 59 200
[16] Mahyuni E L, Haharap U, Harahap R H and Nurmaini 2021 Maced J Med Sci 9 1
[17] Rukmana R and Saputra U 2003 Gulma dan Teknik Pengendalian (Yogyakarta: Kanisius)
[18] https://en.wikipedia.org/wiki/Oxalis#Selected_species
[19] Dalimartha S 2007 Jurnal Pendidikan Biologi Indonesia 1148
[20] Eliza T, Hasunuuddin T and Situmorang S J Ilmu-Ilmu Agribisnis 1 334
[21] Badrunasar A and Santoso H B 2017 Tumbuhan Liar Berkhasiat Obat (Bandung: FORDA PRESS)