



## Research article

### Ethnobotanical survey of medicinal plants of Tehri Garhwal used for skin problems caused by ultraviolet exposure

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#### ABSTRACT

The present investigation focuses on the use of ethnomedicinal plants found in the district Tehri Garhwal for the treatment of skin ailments caused by prolonged exposure to harmful sun UV radiation. Prolonged exposure to harmful UV rays results in skin reddening, irritation, inflammation, flakiness, hyperpigmentation, photoaging, sunburn, blisters, immunosuppression and may even lead to skin cancer. The extensive and intensive survey was carried out in the district Tehri Garhwal, Uttarakhand, India. The villages visited were Dharsal Gaon, Sondkoti, Badon Gaon, Dargi, Semalta, Kemwal Gaon, Manogi, Chaamni, Koldar, Kotdwar, Sursingdhar, Guldi, Nakot, Dikhol gaon, Saabli, Jaakh, Jaghdhar, Lamkot, Kathuli, Naagni, Madan Negi, Chhamund, Dang, Dobra, Kandikhal, Koti, Uniyal Gaon and Pathiana. This informative investigation was carried out through personal interviews with the local inhabitants, especially local *Vaidyas* or medicinal practitioners, old-aged men and women, Gujjars and shepherds. We collected information about 22 plant species belonging to 19 families and 22 different genera, i.e., *Aloe indica* Royle, *Avena sativa* L., *Brassica juncea* (L.) Czern., *Calendula officinalis* L., *Camellia sinensis* var. *sinensis* (L.) Kuntze, *Cannabis sativa* L., *Cassia fistula* L., *Citrus lemon* (L.) Osbeck, *Curcuma domestica* Valet., *Embllica officinalis* Gaertn., *Helianthus annuus* L., *Juglans regia* L., *Luffa cylindrica* (L.) M. Roemer, *Malus domestica* (Suckow) Borkh., *Mentha longifolia* (L.) Huds., *Ocimum basilicum* L., *Piper nigrum* L., *Portulaca oleracea* L., *Prunus armeniaca* L., *Ricinus communis* L., *Rubia cordifolia* L. and *Solanum tuberosum* L. The dominant families were Asteraceae, Lamiaceae and Rosaceae with 2 species each.

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## INTRODUCTION

Skin is the largest organ of the human body, and creates an effective external barrier against the detrimental effects of environmental and xenobiotic agents, such as smoking, contaminants in the air and water, excessive oils and fats, drugs, and heavy metals, which induce extrinsic ageing (Prasanth et al., 2019). Prolonged exposure to harmful UV rays from the Sun results in skin reddening, tanning, irritation, inflammation, flakiness, hyperpigmentation, loosening of the collagen and elastin fibres, photoaging, sunburn, blisters, immunosuppression and may even lead to skin cancer (Autier and Dore, 1998; Phillips et al., 2000). Exposure to UV rays causes oxidative stress which leads to the formation of free radicals. These free radicals pull electrons from other molecules, in turn destabilizing them and turning them to free radicals, which creates a free radical chain reaction. This causes damage to cells, proteins and DNA (Lobo et al., 2010; Dangwal and Uniyal, 2020).

Sunscreens can be applied which either absorb or reflect UV radiation, thereby protecting the skin. However, compounds like titanium dioxide and zinc oxide in

commercial sunscreen creams may create an opaque layer over the skin, which can damage the proper functioning and nourishment of the skin cells and may impose a risk to the skin's health in the long run (Prasanth et al., 2019; Dangwal and Uniyal, 2020). Natural products with antioxidant activity, which could enhance the endogenous capacity of the skin and help neutralize reactive oxygen species (ROS), should be considered as an effective alternative for these chemical agents. Plants rich in antioxidants, such as polyphenols, flavonoids, ascorbic acid, tocopherol and carotenoids, help to reduce the level of ROS and thus treat the sun-damage to the human skin.

From ancient times, various herbs have been used traditionally by ethnic people to protect skin from sunburn (Korać and Khambholja, 2011; Dangwal and Uniyal, 2020). These herbs are applied either topically or taken orally. The naturally occurring compounds, such as anthocyanins, proanthocyanidin, carotenoids, vitamin E & C, resveratrol (*Vitis vinifera* L.), saffranol (*Crocus sativus* L.), boldine (*Peumas boldus* Molina), quercetin (*Vitis vinifera* L.), piperine (*Piper longum* L.), apigenin (*Matricaria chamomilla* L.), silymarin (*Silybum marianum* (L.) Gaertn.), curcumin (*Curcuma longa* L.), 4-

nerolidylcathecol (*Pothomorphe umbellata* (L.) Miq.), wheat germ oil (*Triticum aestivum* L.) and pumpkin seed oil (*Cucurbita maxima* Duchesne ex Lam.) provide photo-protective and antioxidant properties (Röpke et al., 2003; Golmohammadzadeh et al., 2010; Korać and Khambholja, 2011; Saewan and Jimtaisong, 2013; Georgiev et al., 2014; Choochana et al., 2015). Plant species, like *Ricinus communis* L., *Cicer arietinum* L., *Dalbergia sissoo* Roxb., *Vitex negundo* L., *Musa balbisiana* Colla. etc., are traditionally used to treat Sun-related skin problems in Uttarakhand (Uniyal and Dangwal, 2020; Kumar et al., 2022b). These plants have one of three effects on the affected area – anti-inflammatory effect, anti-microbial effect, anti-cancerous effect and/or healing effect.

Uttarakhand is a rich reservoir of biodiversity enriched with valuable traditional knowledge about various medicinal plants. Physio-geographically the state can be divided into three zones, namely the Himalayas, the Shivalik and the terrain region (Kumar et al., 2022a). It is home to many indigenous communities, knowledgeable villagers and medicinal practitioners who have excellent traditional knowledge of medicinal plants used to treat various skin problems. Lying on the southern slopes of mid-Himalayas, Tehri Garhwal is one of the ecologically diverse, hilly districts of Uttarakhand state. The flora of the district includes the vast range found in the Himalayas, varying from the sub-tropical species which grow in the outer ranges of low hills to the rich alpine flowers in the north (Uniyal et al., 2021). Many ethnobotanists had documented the traditional uses of medicinal plants in Uttarakhand Himalaya (Badoni, 1987-1988; Gaur, 1999; Rawat et al., 2001; Dangwal et al., 2010; Gangwar et al., 2010; Singh and Rawat, 2011; Joshi, 2012).

The study on ethnomedicinal plants used by people of Tehri district to cure skin diseases related to sun UV-damaged skin has not been adequately documented by previous workers. Therefore, in the present study, we have collected information from different villages of the district on the traditional uses of medicinal plants in the treatment of sun-damaged skin. We found 22 plant species that are known to have cooling, sun-blocking, anti-inflammatory, anti-cancer and/or cell repairing effects on the UV-exposed and UV-damaged skin.

## MATERIAL AND METHODS

The study was carried out in Tehri Garhwal which is located on the outer ranges of the mid-Himalayas which comprise low line peaks rising contiguously with the planes of northern India. It lies in between 30°10' – 30°17'N latitude and 78°18' – 78°30' E longitude at an altitudinal range of 275 – 4258 m a.s.l. (Dangwal et al., 2010). It is surrounded by the district Rudraprayag in the east, Dehradun in the west, Uttarkashi in the north and Pauri in the south. District Tehri Garhwal stretches from the snowclad Himalayan peaks of Thalaiya Sagar, Jonli and the Gangotri group all the way to the foothills near Rishikesh (Uniyal et al., 2021). The present ethnobotanical study was carried out in 28 villages - Dharsal Gaon, Sondkoti, Badon Gaon, Dargi, Semalta, Kemwal Gaon, Manogi, Chaamni, Koldar, Kotdwar, Sursingdhar, Guldi, Nakot, Dikhol gaon, Saabli, Jaakh, Jaghdhar, Lamkot, Kathuli, Naagni, Madan Negi, Chhamund, Dang, Dobra, Kandikhal, Koti, Uniyal Gaon and Pathiana.

Extensive and intensive field surveys of medicinal plants used in the treatment of solar UV-damaged human skin were conducted at different months, and season's months of the year from various elevations. This informative investigation was carried out through personal interviews with the local inhabitants, especially local *Vaidyas* or medicinal practitioners, old-aged men and women, Gujjars and shepherds. We have interviewed 8-10 knowledgeable people from each village for proper data collection. The collected data was thoroughly verified with the help of available relevant literature. Primary data obtained from local informants were translated, compiled and listed in an efficient manner.

## RESULTS

A total of 22 plants have been recorded with protective effects against UVB exposure on the skin. These plants are arranged alphabetically in Table 1. Information about their families, common names, parts used and their medicinal uses related to sun UV-damaged human skin are also provided in this section.

**Table 1.** Traditionally used medicinal plants for the treatment of solar UV-damaged human skin in Tehri Garhwal

S.No.	Botanical name	Family	Common name	Part/s used	Medicinal uses
1.	<i>Aloe indica</i> Royle	Asphodelaceae	Aloe vera, Ghritkumari, Patanghara	Leaves	Pulp of leaf is applied on sunburns; can be applied daily before going out in the Sun on the exposed skin as a sunscreen; good for dry skin and preventing premature wrinkling; relieves pain, reduces redness and inflammation; also prevents infection.
2.	<i>Avena sativa</i> L.	Poaceae	Oats, Jayee	Seeds	A paste of grains mixed with milk is applied topically to give relief from dry and itchy skin; reduces hyperpigmentation; it has anti-inflammatory properties.
3.	<i>Brassica juncea</i> (L.) Czern.	Brassicaceae	Canola, Brown mustard, Rai, Lai	Seeds, Leaves	Seed oil mixed with a little turmeric powder is applied externally on the sunburnt skin and skin inflammation; can be applied daily on the exposed skin for sun-screening and at night for healing dry

					skin. Leaves used in cooking provide a good anti-oxidant source, thereby helping in preventing premature ageing and skin cancer.
4.	<i>Calendula officinalis</i> L.	Asteraceae	Marigold, Genda	Flowers	Extract of flowers is applied topically to get relief from irritation, inflammation, redness and sunburn.
5.	<i>Camellia sinensis</i> v ar. <i>sinensis</i> (L.) Kuntze	Theaceae	Tea, Chai	Leaves	Leaves extract is taken orally or applied topically on the affected area; fights photoaging; repairs sunburnt skin.
6.	<i>Cannabis sativa</i> L.	Cannabaceae	Marijuana, Hemp, Bhaang	Seeds	Seed oil is applied externally as sunscreen protection from tanning and sunburn; also reduces hyperpigmentation when applied overnight.
7.	<i>Cassia fistula</i> L.	Fabaceae	Indian laburnum, Amaltas	Leaves	A thick paste of leaves mixed with coconut oil is applied externally to sunburns.
8.	<i>Citrus lemon</i> (L.) Osbeck	Rutaceae	Bada Nimbu	Fruit	Fruit juice is applied on dark sunspots (gives a fast effect). Drinking lemon juice prevents premature ageing, repairs dry skin, have high antioxidant properties which help in preventing skin cancer.
9.	<i>Curcuma domestica</i> Valetton.	Zingiberaceae	Turmeric, Haldi	Rhizome	Paste of rhizome and milk or curd is applied topically for treating sun-tans and hyperpigmentation.
10.	<i>Embllica officinalis</i> Gaertn.	Phyllanthaceae	Indian gooseberry, Amla	Fruit	Eating fruit regularly or having fruit juice is good for the skin; repairs scaly, dry skin; removes dark spots; repairs sunburn and reduces inflammation.
11.	<i>Helianthus annus</i> L.	Asteraceae	Sunflower, Surajmukhi	Seeds	Oil applied topically on the affected part; anti-inflammatory and anti-photoaging properties.
12.	<i>Juglans regia</i> L.	Juglandaceae	Walnut, Akhrot	Bud, Fruit	Drinking bud extract, diluted in water, twice daily heals sun-damaged skin. Green fruit extract is applied topically to repair skin. It has anti-photoaging and anti-inflammatory properties.
13.	<i>Luffa cylindrica</i> (L.) M. Roemer	Cucurbitaceae	Sponge gourd, Ghiya torai	Seeds	The seed oil has anti-inflammatory properties; gives relief to skin inflammation.
14.	<i>Malus domestica</i> (Suckow) Borkh.	Rosaceae	Apple, Seb	Fruit	Ingesting a fruit daily is good for the skin; juice is applied topically to reduce skin inflammation.
15.	<i>Mentha longifolia</i> (L.) Huds.	Lamiaceae	Wild mint, Jangli pudina	Leaves, Top shoot	Leaf extract or essential oil is applied externally on the inflamed and sunburnt skin for cooling relief.
16.	<i>Ocimum basilicum</i> L.	Lamiaceae	Sweet Basil, Jangli Tulsi, Ram Tulsi	Leaves, Flowers	Leaf paste is applied on the sunburned skin for cooling and healing purposes; essential oil can be applied on reddened, itchy and/or inflamed skin; also known to have good anti-cancerous potential.
17.	<i>Piper nigrum</i> L.	Piperaceae	Black pepper, Kaali mirch	Fruit	The extract is taken orally because of its anti-inflammatory property; prevents skin cancer.
18.	<i>Portulaca oleracea</i> L.	Portulacaceae	Purslane, pigweed, Lunia	Leaves	Aqueous extract of leaves is applied topically to soothe the skin, relieving it of skin inflammations and rashes during scorching heat.
19.	<i>Prunus armeniaca</i> L.	Rosaceae	Apricot, Chulu	Seeds, Fruit	Seed oil is applied for treating skin inflammation and sunburns. It also provides a cooling effect. Fruit can be consumed which promotes repairing (anti-oxidant) sun-damaged skin cells and thus

					prevents premature ageing.
20.	<i>Ricinus communis</i> L.	Euphorbiaceae	Castor oil plant, Arandi, Andi	Seeds	Seed oil is applied topically regularly overnight to treat dryness, hyperpigmentation, redness and inflammation.
21.	<i>Rubia cordifolia</i> L.	Rubiaceae	Indian madder, Manjistha	Root	Root powder mixed with turmeric and honey/rose water is applied to the affected area to cure dryness and tanning. Root powder mixed in water is taken as a tonic for brightening skin.
22.	<i>Solanum tuberosum</i> L.	Solanaceae	Potato, Alu	Tuber	Tuber juice is applied externally for a faster effect on sun-tans and sunburnt skin; prevents premature wrinkling of the skin; reduces redness and inflammation.

## DISCUSSION

The present study has yielded fewer known uses of some locally available medicinal plants in protecting and healing sun-damaged human skin. We collected information about 22 plant species belonging to 19 families and 22 different genera – *Aloe indica* Royle, *Avena sativa* L., *Brassica juncea* (L.) Czern., *Calendula officinalis* L., *Camellia sinensis* var. *sinensis* (L.) Kuntze, *Cannabis sativa* L., *Cassia fistula* L., *Citrus lemon* (L.) Osbeck, *Curcuma domestica* Valet., *Embllica officinalis* Gaertn., *Helianthus annuus* L., *Juglans regia* L., *Luffa cylindrica* (L.) M. Roemer, *Malus domestica* (Suckow) Borkh., *Mentha longifolia* (L.) Huds., *Ocimum basilicum* L., *Piper nigrum* L., *Portulaca oleracea* L., *Prunus armeniaca* L., *Ricinus communis* L., *Rubia cordifolia* L. and *Solanum tuberosum* L. The dominant families were Asteraceae, Lamiaceae and Rosaceae with 2 species each. Other families mentioned were Euphorbiaceae, Rubiaceae, Phyllanthaceae, Cucurbitaceae, Theaceae, Juglandaceae, Cannabaceae, Poaceae, Asphodelaceae, Brassicaceae, Rutaceae, Piperaceae, Solanaceae, Portulacaceae, Zingiberaceae and Fabaceae, with 1 plant species each. The plant parts used for herbal remedies were seeds, root, leaves, fruit, bud, tuber, rhizome, flowers and top shoot. The most utilized plant parts were seeds and leaves, used in medicinal uses of 7 plant species each. The least plant part used in the study were bud, root, top shoot, tuber and rhizome, used by 1 plant species each.

The plants studied were used for the treatment of skin dryness, redness, itchiness, irritation, inflammation, tanning, hyperpigmentation, sunburns, photoaging and sun spots. Three of the studied plants, i.e., *Aloe indica* Royle, *Cannabis sativa* L. and *Brassica juncea* (L.) Czern., were natural sunscreens helpful in curing sun-tanned and sunburnt skin. Plant species, like *Aloe indica* Royle, *Mentha longifolia* (L.) Huds., *Portulaca oleracea* L., *Prunus armeniaca* L. and *Ocimum basilicum* L., provide a cooling effect and relieve the pain and discomfort related to the sun-damaged skin. Dryness of the skin may be caused by prolonged sun exposure leading to scaling, itching and cracking of the skin. This was treated using plants, like *Aloe indica* Royle, *Avena sativa* L., *Brassica juncea* (L.) Czern., *Embllica officinalis* Gaertn., *Juglans regia* L., *Ricinus communis* L. and *Rubia cordifolia* L. Some plants carry anti-inflammatory property which helps in case of redness, itchiness and inflammations related to long sun exposure. Such plants included in the study were *Luffa cylindrica* (L.) M. Roemer, *Malus domestica*

(Suckow) Borkh., *Mentha longifolia* (L.) Huds., *Ocimum basilicum* L., *Piper nigrum* L., *Portulaca oleracea* L., *Prunus armeniaca* L., *Ricinus communis* L., *Embllica officinalis* Gaertn., *Helianthus annuus* L., *Juglans regia* L., *Aloe indica* Royle, *Avena sativa* L. and *Brassica juncea* (L.) Czern.

Two of the common skin problems related to sun damage include dark sun spots and hyperpigmentation (melasma) of the exposed skin area. These problems can be treated naturally with the help of *Avena sativa* L., *Cannabis sativa* L., *Solanum tuberosum* L., *Citrus lemon* (L.) Osbeck, *Ricinus communis* L., *Embllica officinalis* Gaertn. and *Rubia cordifolia* L. Plants that are rich in antioxidants, like *Camellia sinensis* var. *sinensis* (L.) Kuntze, *Juglans regia* L., *Ocimum basilicum* L., *Helianthus annuus* L., *Aloe indica* Royle, *Brassica juncea* (L.) Czern., *Citrus lemon* (L.) Osbeck, *Piper nigrum* L., *Solanum tuberosum* L. and *Prunus armeniaca* L., are very helpful in preventing premature ageing and cancer and help in the cell repairing process which heals the damaged skin.

## CONCLUSION

Long exposure to the Sun causes tanning, sun spots, early ageing, inflammation, sunburns and other skin issues, ultimately leading to skin cancer. The local medical practitioners or *Vaidyas*, indigenous communities, shepherds and old knowledgeable people have been conserving their traditional knowledge, but the newer generations are getting detached from their roots. If not properly investigated and documented soon, this traditional knowledge will be lost forever. Our study revealed 22 important medicinal plants used in the treatment of various skin ailments related to solar damage. There is still great scope for finding some more very helpful medicinal plants, through an ethnobotanical research approach, that carry miraculous sun-screening and/or sun-protecting properties in them. This knowledge can be further analyzed in research laboratories for the production of better herbal sunscreen formulations. Moreover, we suggest making people aware of the importance of conserving and the benefit of cultivating such important medicinal plants through various public awareness programs. With the growing demand for herb-based medicinal and cosmetic products nowadays, the scope of herb-based industries and related fields is rising. With this, the requirement for such useful plants is inevitable and thus farmers will surely benefit economically by cultivating such medicinal plants in future.

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## CONFLICTS OF INTEREST

The author(s) declare(s) no conflicts of interest.

## DECLARATION

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## REFERENCES

- Autier P, Dore JP (1998). Influence of sun exposures during childhood and during adulthood on melanoma risk. EPIMEL and EORTC Melanoma Cooperative Group. European Organisation for Research and Treatment of Cancer. *International Journal of Cancer*, 77, 533-537.
- Badoni AK (1987-1988). Ethnobotany of hill tribes of Uttarkashi, plants used in rituals and psychomedicinal practices. *Journal of Himalayan Studies and Regional Development*, 11&12, 103-115.
- Choochana P, Mounjaroen J, Jongkon N, Gritsanapan W, Tangyuenyongwatana P (2015). Development of piperinic acid derivatives from *Piper nigrum* as UV protection agents. *Pharmaceutical Biology*, 53(4), 477-482.
- Dangwal LR, Sharma A, Rana CS (2010). Ethnomedicinal plants of the Garhwal Himalaya used to cure various diseases: a case study. *New York Science Journal*, 3(12), 28-31.
- Dangwal LR, Uniyal P (2020). Some common medicinal plants used in protecting skin from Sun damage in district Tehri Garhwal, Uttarakhand, India. *Ecology, Environment and Conservation*, 26(Suppl. Issue), S39-S45.
- Driscoll MS, Wagner RF (2000). Clinical management of the acute sunburn reaction [review]. *Cutis*, 66, 53-58.
- Gangwar KK, Deepali, Gangwar, RS (2010). Ethnomedicinal Plant Diversity in Kumaun Himalaya of Uttarakhand, India. *Nature and Science*, 8(5), 66-78.
- Gaur RD (1999). Flora of the District Garhwal North West Himalaya (with ethnobotanical notes). Transmedia, Srinagar Garhwal, Uttaranchal, India, p. 811.
- Georgiev V, Ananga A, Tsoleva V (2014). Recent advances and uses of grape flavonoids as nutraceuticals. *Nutrients*, 6(1), 391-415.
- Golmohammadzadeh S, Jaafari MR, Hosseinzadeh H (2010). Does saffron have antisolar and moisturizing effects? *Iranian Journal of Pharmaceutical Research*, 9(2), 133-140.
- Joshi, GC (2012). Indigenous uses of threatened ethno-medicinal plants used to cure different diseases by ethnic people of Almora district of western Himalaya. *International Journal of Ayurvedic and Herbal Medicine*, 2(4), 661-678.
- Korać RR, Khambholja KM (2011). Potential of herbs in skin protection from ultraviolet radiation. *Pharmacognosy Reviews*, 5(10), 164-173.
- Kumar P, Dangwal LR, Uniyal P (2022b). Ethno-medicinal plants used to cure various skin diseases of humans in the district of Haridwar, Uttarakhand, India. *The Mysore Journal of Agricultural Sciences*, 56(2), 256-263.
- Kumar P, Dangwal LR, Uniyal P, Lal T (2022a). Ethno-medicinal uses of some aquatic plants in district Haridwar, Uttarakhand. *International Journal of Botany Studies*, 7(1), 388-393.
- Lobo V, Patil A, Phatak A, Chandra N (2010). Free radicals, antioxidants and functional foods: Impact on human health. *Pharmacognosy Reviews*, 4(8), 118-126.
- Phillips TJ, Bhawan J, Yaar M, Bello Y, Lopiccio D, Nash JF (2000). Effect of daily versus intermittent sunscreen application on solar simulated UV radiation-induced skin response in humans. *Journal of the American Academy of Dermatology*, 43, 610-618.
- Prasanth MI, Sivamaruthi BS, Chaiyasut C, Tencomnao T (2019). A review of the role of green tea (*Camellia sinensis*) in anti-photoaging, stress resistance, neuroprotection, and autophagy. *Nutrients*, 11(2), 474.
- Rawat DS, Bhandari BS, Gaur RD (2010). Vegetational Wealth. In: Garhwal Himalaya Nature, Kandari OP, Gusain OP (Eds), Culture and Society Pub. Co., Trans media House Srinagar (Garhwal), pp. 70-92.
- Röpke CD, Kaneko T, Rodrigues RM, da Silva VV, Barros S, Sawada TCH, Kato M, Barros S (2002). Evaluation of percutaneous absorption of 4-nerolidylcatechol from four topical formulations. *International Journal of Pharmaceutics*, 249, 109-116.
- Saewan N, Jimtaisong A (2013). Photoprotection of natural flavonoids. *Journal of Applied Pharmaceutical Science*, 3(9), 129-141.
- Singh G, Rawat GS (2011). Ethnomedicinal Survey of Kedarnath Wildlife Sanctuary in Western Himalaya, India. *Indian Journal of Fundamental and Applied Life Sciences*, 1(1), 35-46.
- Uniyal P, Dangwal LR, Lal T (2021). An ethnomedicinal note on *Ricinus communis* L. (Family Euphorbiaceae) in Tehri Garhwal, Uttarakhand. *International Journal of Botany Studies*, 6(6), 1126-1129.
- Uniyal P, Dangwal LR (2020). Plant Growth Analysis in *Ricinus communis* L. (Family Euphorbiaceae) Grown in Temperate Region in Tehri Garhwal. In: Promoting the Advancement of Applied Sciences, Negi US, Petwal KC (Eds), ABS Books, Delhi, pp. 177-188.

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