

Weeds as plant genetic resources for production of nutritious supplementary food in agriculture¹

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Abstract: A number of weed plants available in Bangladesh have potential uses as food for human and as medicinal purposes, which need to be conserved in a well-managed herb garden. Most of these weeds can be eaten raw as salad, cooked in soup or the seeds and leaves ground and consumed as teas or in porridge. They are high in essential minerals especially in calcium, magnesium, iron, phosphorus, manganese, zinc etc. They are also high in vitamins A, C, D, and K, niacin, thiamin, riboflavin etc. Some of these are useful for the remedy of digestive disorders, reduce cholesterol levels, some are used as antidotes against poisoning from arsenic and mercury. Watercress is a good source of antioxidants and helps in curing breast cancer and the weed can also be grown as trap crop for caterpillars and black aphids. White horehound can be used as natural repellants for grasshoppers. Ash of bracken is high in potassium and can be used in the fields as fertilizer. Research initiatives to study some of these weeds turning them as PGRFAs (Plant Genetic Resources for Food and Agriculture) specifically focusing on their biology, their potential for food production, advanced growing techniques, etc. have been emphasized.




Introduction







The genetic resources of a plant species are the genetic configurations generated in the course of its evolution under the influence of both natural and artificial selection (1). The importance of plant genetic resources as the ultimate source of food is enormous. Their loss constitutes a serious threat to world food security. The conservation of genetic resources goes far beyond the salvation of species. The objective must be to conserve sufficient diversity within each species to ensure that its genetic potential will be fully available in the future (2). Conservation and sustainable utilization of genetic resources of food crops is of vital importance for solving food problems of the growing world populations. These genetic resources might be cultivated crop plants, their wild relatives, weed species and the like. Weeds are those plants which are






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unwanted found growing mainly in crop fields which reduces crop yields and qualities. When these weed plants are looked upon as potential genetic resources which can be turned into useful crops, they then become praiseworthy. Bangladesh is a sub-tropical country having both high temperatures and humidity especially in the summer seasons encourages luxuriant growth of many weed species. A total of 350 species have been identified by several authors in the country (3) and among these many are potential food sources which hold promises for future crop improvement as genetic resources (Table 1). Malaker *et al.* (4) identified 110 plant species which have been using by the ethnic peoples of Bangladesh as a source of food, medicines, ornamentals, firewood and other purposes.






Table 1. List of weeds as important genetic resources





Common name	Scientific name (family)	Photograph	Habitat/ Crop association	Contributing attributes
1. Mallow	<i>Malva neglecta</i> (Malvaceae)		Weed of lawn	High in minerals, calcium and magnesium; also contain potassium, iron, selenium and vitamins A & C.
2. Dandelion	<i>Taraxacum officinale</i> (Asteraceae)		Weed of lawn, dryland crops	Good source of folate, magnesium, phosphorus and copper; very good source of vitamins A, C, E, and K, thiamin, riboflavin, calcium, iron, potassium, and manganese.
3. Clover	<i>Trofolium repens</i> (Leguminosae)		Weed of lawn, pulse crops and sugarcane	Good source of calcium, chromium, magnesium, niacin, phosphorus, thiamin and vitamin C.



4. Lamb's quarter	<i>Chenopodium album</i> (Chenopodiaceae)		Weed of wheat, pulses and oilseeds	High in vitamins A, C & K, Vitamin B6, niacin, riboflavin, thiamin, folate, magnesium, phosphorus, iron, calcium, sodium, selenium and silicon.
5. Chickweed	<i>Stellaria media</i> (Caryophyllaceae)		Weed of maize, wheat, potato etc.	High in vitamins A & C, niacin, riboflavin, thiamin, magnesium, iron, calcium, magnesium, sodium, selenium and silicon.
6. Purslane or Pigweed	<i>Portulaca oleracea</i> (Portulacaceae)		Weed of lawn, wheat, pulses, maize and sugarcane	Rich source of Omega-3 fatty acids and a linolenic acid. Also rich in calcium, phosphorus, magnesium, sodium, potassium, zinc, vitamin C. thiamin, riboflavin and niacin.
7. Duckweed	<i>Spirodela polyrhiza</i> (Lemnaceae)		Weed of transplanted rice, ponds.	Very high in protein
8. Alligator weed	<i>Alternanthera philoxeroides</i> (Amaranthaceae)		Weed of lowland rice, pond, swamp	High in protein content
9. Milkweed	<i>Asclepias syriaca</i> (Apocynaceae)		Weed of potato, corn, cabbage, cauliflower	Very high in minerals. Emits a chemical that breaks up hard soil, allowing nearby plants to develop healthier root systems.

10. Water cress	<i>Nasturtium officinale</i> (Brassicaceae)		Semi-aquatic perennial weed	Contain significant amount of iron, calcium and folic acid. Also contain vitamins A & C. A source of antioxidants and helps in curing breast cancer. Acts as trap crop for caterpillars and black aphids.
11. Jungle rice	<i>Echinochloa colona</i> (Poaceae)		Important weed of different rice	As part of staple diet, the seeds are ground into flour for making porridge or bread.
12. Stinging nettle	<i>Urtica dioica</i> (Urticaceae)		Roadside weed, Sugarcan e, maize.	High in iron, potassium, manganese, calcium and vitamins A & D. Leaves can be used to prepare tea (tisane).
13. Wild mustard	<i>Brassica campestris</i> (Brassicaceae)		Weed of radish, cabbage, cauliflower etc.	Leaves are eaten as green vegetable, seeds contain high fatty acids.
14. Horsetail	<i>Equisetium telmateia</i> (Equisetaceae)		Roadside weed, of some dry land crops.	Contain vitamin D and high in silica. Tops can be eaten as green vegetable

15. Wild garlic	<i>Allium vineale</i> (Amaryllidaceae)		Roadside weed	Can be used as insect repellent in food crops
16. Shepherd's purse	<i>Capsella bursa-pastoris</i> (Brassicaceae)		Common garden weed	Leaves and stem are used as green vegetables or addition to salads. Young flowering shoots can be eaten in the same way as broccoli. Seeds are high in oil and ground seeds are used as soup.
17. Common thistle, Spear thistle	<i>Cirsium vulgare</i> (Asteraceae)		Weed of rabi crops especially pulse.	The young stems can be peeled and cooked like asparagus. Young leaves and roots have a fairly bland flavour and can also be eaten raw or cooked
18. Couch grass	<i>Elymus repens</i> (Poaceae)		Invasive garden weed	Roasted and ground couch roots are used as coffee substitute. Root powder also used with wheat when make bread. The roots being very useful in the treatment of kidney, liver and urinary disorders.

19. Yellow sorrel	<i>Oxalis corniculata</i> (Oxalidaceae)		Weed of lowland rice, garden weed.	Leaves and flowers have acidic flavor and used in salads. The leaves are also used as an antidote to poisoning by the seeds of <i>Datura spp</i> , arsenic and mercury, whilst the leaf juice has a soothing effect when applied to insect bites, burns and skin eruptions.
20. Common plantain	<i>Plantago major</i> (Plantaginaceae)		Common lawn weed	The leaves are blanched in boiling water and used in salads. When dried they can make a good tea. For medicinal purposes, the leaves are used as a healing poultice. Plantain seed husks are an excellent treatment for digestive disorders and reducing cholesterol levels in body.
21 Japanese knotweed	<i>Polygonum japonicum</i> (Polygonaceae)		Garden weed	The young shoots, can be eaten either cooked or used as a rhubarb substitute in pies, fruit soups, jams etc. The seed can be ground into a powder and used as a flavouring and thickener in soups etc, or can be mixed with cereals when making bread, cakes etc.
22. Cobler's peg	<i>Bidens pilosa</i> (Asteraceae)		Roadside weeds	Leaves are a very good source of chlorophyll, vitamin C, calcium, iron, potassium and magnesium. Tannin, in the plant, has made it a treatment for diarrhoea and dysentery, and for respiratory congestion.
23. Bracken	<i>Pteridium aquilinum</i> (Dennstaedtiaceae)		Forest weed, roadside weed	The roots and young shoots are edible. Bracken fiddleheads are either consumed fresh or cooked, or preserved by salting, pickling, or sun drying. The ashes of the plant are rich in potassium and can be used as a fertilizer.

24. Knotweed	<i>Polygonum aviculare</i> (Polygonaceae)		Wheat fields or low lying fallow land.	Young leaves and plants can be used raw or cooked. They are very rich in zinc. Seeds can also be eaten as raw or cooked. They can be used either whole or dried and ground into a powder for use in pancakes, biscuits. The leaves are a tea substitute.
25. Curled dock	<i>Rumex crispus</i> (Polygonaceae)		Waste land, Roadside	The leaves are very rich in vitamins and minerals, especially iron and the vitamins A and C. The leaves can be added to salads, cooked as a potherb or added to soups. Stems are peeled and the inner portion is eaten. Seeds are ground into a powder and used as flour for making pancakes.
26. Kangkong	<i>Ipomea aquatica</i> (Convolvulaceae)		Semi-aquatic weed	It is an excellent source of iron and good source of calcium. It is also a good source of vitamins B and G, and an excellent source of vitamin C.
27. Green amaranth, Slender amaranth	<i>Amaranthus viridis</i> (Amaranthaceae)		Weed of kharif crops, e.g. upland rice, vegetables.	The leaves and young plants (before they come into flower) are eaten as a cooked vegetable. The plant is also a good cattle fodder and green manure.

28. Field milk thistle	<i>Sonchus arvensis</i> (Asteraceae)		Garden weed	The young leaves can be added to salads or cooked like spinach. The mild flavoured stems can be cooked like asparagus or rhubarb, whilst the roasted root is used as a coffee substitute.
29. Garlic mustard	<i>Alliaria petiolata</i> (Brassicaceae)		Roadside weed	The chopped leaves are used for flavoring in salads and sauces such as pesto. The seeds are sometimes used to season food.

Details of the species are important for future reference and uses.

1. **Mallow** (*Malva neglecta*): This is a weed in well-manicured lawn. It is used as nutritious food in Pakistan. It is high in minerals, calcium, and magnesium. They also contain potassium, iron, selenium and vitamins A and C. (5). Alessandra Giuliani (2012) stated that mallow should be developed as a crop to promote biodiversity in agriculture as a way to deal with “Third World Poverty and Climate Change”. All parts of the mallow plant e.g. leaves, stems, flowers, seeds and roots are edible. It is eaten as green salad or cooked food such as mallow soup. “Melokhia” is a versatile dish of mallow leaves flavoured with coriander and cayenne pepper in Turkey, Egypt and other Middle Eastern countries (6). It is also used as anti-ulcerogenic activity in many countries.

2. **Dandelion** (*Taraxacum officinale*): It is a lawn weed. Sometimes found in rabi crops especially pulses. As food it has manifold uses. The leaves, flowers and roots of dandelion are all edible. The leaves are best as food if they are picked up before flowering. Young leaves are best for salad. The food made from dandelion is low in saturated fat, and very low in cholesterol. It is a good source of folate, magnesium, phosphorus and copper, and a very good source of dietary fiber, vitamin A, vitamin C, vitamin K, vitamin E, thiamin, riboflavin, vitamin B6, calcium, iron, potassium and manganese. (7). Some of the dandelion recipes are – dandelion fritters, dandelion soups, dandelion greens, dandelion-pineapple juice, dandelion-infused oil, roasted dandelion root coffee etc (8). There is no harmful substance in dandelion root coffee, unlike our

commercial coffees that do far more harm than good. It contains a substance called “inulin”, which is an important ingredient in managing diabetes.

3. **Clovers** (*Trifolium repens*): It is an important weed of leguminous crops and other winter crops in Bangladesh. The leaves, flowers, seeds and roots of clover are edible. Young leaves of clover can be eaten raw in salad, especially when they are picked up before the plant flowers. The dried leaves add a vanilla-like flavour to baked foods. The flowers are used raw in salad as well as sautéed, stir-fried or fried as fritters. They are also popular for making teas and wines. The flowers and seeds can be dried and ground into flour. It can also be used to prepare lemondale, juice, pancakes, jelly and biscuits. Clovers are good sources of calcium, chromium, magnesium, niacin, phosphorus, thiamin and vitamin C. (9).

4. **Lamb’s quarter** or fathen (*Chenopodium album*): It is an important weed of rabi crops, especially wheat, pulses, onion, sugarcane and oilseeds. The plants have small, grey-green leaves that form on shrubby stalks. The tender leaves and stems can be eaten raw as salad. It can also be steamed and used as leafy vegetables. It is low in saturated fat and very low in cholesterol. It is a good source of niacin, folate, iron, magnesium and phosphorus. It is also rich in protein, vitamins A, C and K, thiamin, riboflavin, vitamin B6, calcium, potassium, copper and manganese.

5. **Chickweed** (*Stellaria media*): It is an important weed of maize, wheat, sugarcane etc. It grows in dense mats low to the ground. Chickweed is beautiful in appearance, delicate and tasty herb. The leaves, stems, flowers, seeds are all edible. It has very inviting flavour, mild and very green. The best way of eating chickweed is raw. It is much more suited for droppings into salad. It can also be used as soup or stir-fried. Some other ways of eating chickweed are steamed chickweed, chickweed pesto, smoked salmon with chickweed chimichuri, chickweed tea, chickweed tonic, green vegetables, etc (10). Chickweed is high in vitamin C, vitamin A, niacin, riboflavin, thiamin, magnesium, iron, calcium, manganese, sodium, selenium and silicon (11) .

6. **Purselane** (*Portulaca oleracea*): Purselane is also found to grow in rabi crops like, wheat, cabbage, cauliflower, sugarcane etc. It is a nutritious vegetable for human consumption. It is eaten as salad or cooked as soups or greens. The seeds can be ground into powder and mixed with cereals for use in gruels, bread, pancakes etc. It provides a rich source of omega-3 fatty

acids and a-linolenic acid (Simopoulos and Salem, 1986). It is rich in calcium, phosphorus, magnesium, sodium, potassium, zinc, vitamin A, thiamin, riboflavin and niacin (12). It helps in thickening items like soups and stews, conferring a flavour and delicious taste on them. Purselane has been used as antiseptic, anti-diuretic, vermifuge in oral ulcer and urinary disorders (13).

7. **Duckweed** (*Spirodela polyrhiza*): Duckweed is an aquatic weed of transplanted rice. It is also found as pond weed. This aquatic weed is very high in protein. The whole plant is edible but mainly used as soups. Since harmful microbe may live inside the plant, it is better to cook it before being eaten.

8. **Alligator weed** (*Alternanthera philoxeroides*): Alligator weed is a semi-aquatic weed that grows in shallow fresh water areas such as swamp and wetland that receives a good amount of sunlight. It produces stems and leaves that are edible when cooked. It has high level of protein and other nutrient elements. (14).

9. **Milkweed** (*Asclepias sp.*): Milk weed is a roadside weed or garden weed. The weed produces shoots, flower buds and seed pods that are edible when they are young either as raw or cooked. It is very rich in minerals.

10. **Stinging nettle**: (*Urtica dioica*): It is a roadside weed. Sometimes occur in fruit gardens. The best know characteristic of stinging nettle is the burning sting that can come from touching the plant. The hairs on the stem and leaves contain mixture of chemicals sitting at the base of hairs. When anybody touches the hairs, they are broken and they expose a sharp point that get beneath the skin and inject the man with the chemicals. The chemicals include histamine, acetylcholine, serotonin and formic acid.

Stinging nettle is a power house of nutrients and is known for medicinal benefits as well. The most commonly eaten parts of the nettle are leaves and roots. The leaves should be cooked before eating since it helps in neutralizing the stings. If green leaves are to be eaten, they should be soaked in water for few hours. Nettle leaf tea is one of the most popular herbal teas. Besides these, it can be used to prepare springtime nettle soup, green golden soup, nettle-yogurt dip, green nettle gnocchi with cream and herbs. The nettles are high in iron, potassium, manganese, calcium and vitamin A, C and D. Because of its high iron content, nettle leaf tea is

recommended for treating anemia and fatigue. Nettle is also high in vitamin K and other nutrients that make it a desirable tonic during pregnancy (15).

11. **Watercress** (*Nasturtium officinale*): It is a fast growing aquatic or semi-aquatic weed. It is used as leafy vegetables. All parts of the plants are edible; flowers and leaves make brilliant salad decoration. It contains significant amount of iron, calcium and folic acid, in addition to vitamin A and C. It acts as stimulants, a source of polychemicals and anti-oxidant, a diuretic, an expectorant and a digestive aid. It also helps in curing breast cancer (16).

12. **Jungle rice** (*Echinochloa colona*): Jungle rice is an important grass weed of rice. As food, the seeds of the weed are ground into flour from which porridge or bread can be prepared. In India, the seeds are used as rice. While being part of staple diet for some communities in India the seeds are in particular (cooked and) eaten during religious fasting (17).

13. **Shepherd's Purse** (*Capsella bursa-pastoris*): Shepherd's Purse is an annual plant and a very common garden weed; it can flower and produce seeds all year round and will often spread freely in cultivated ground. It is extensively cultivated in some areas of the world as a cabbage-flavoured spring greens, whilst in Japan it is one of the essential ingredients of a ceremonial rice and barley gruel that is eaten on January 7th. The young leaves, used before the plant comes into flower, make a fine addition to salads, whilst older leaves are a cress and cabbage substitute, becoming peppery with age. The young flowering shoots can be eaten in the same way as broccoli. The seeds are rich in oil and, although small and very fiddly to harvest, can be eaten raw or cooked - it used to be ground into a meal and used in soups etc. The seed pods can be used as a peppery seasoning for soups and stews, whilst the fresh or dried root is used as a ginger substitute. The plant has long been used as a domestic herbal remedy, particularly in the treatment of both internal and external bleeding, diarrhoea etc. The seed, when placed in water, attracts mosquitoes. It has a gummy substance that binds the insect mouths to the seed. The seed also releases a substance toxic to the larvae (18).

14. **Common thistle:** (*Cirsium vulgare*). Common thistle is a biennial aggressive weed. The young roots of the species can be eaten raw or cooked. Although nutritious, they are rather bland with a taste reminiscent of Jerusalem artichokes. They are probably best when used in a mixture with other vegetables. The young stems can be peeled and cooked like asparagus. Young leaves have a fairly bland flavour and can also be eaten raw or cooked, but the prickles need to be removed before the leaves can be eaten (19).

15. **Yellow sorrel** (*Oxalis corniculata*): It is a low-growing annual or short-lived perennial weed found in lowland rice with high moisture in the soil. Both the leaves and the flowers have a pleasant acid flavour, rather like sorrel. It can be eaten in the salads. The leaves are used as an antidote to poisoning by the seeds of *Datura* spp, arsenic and mercury, whilst the leaf juice has a soothing effect when applied to insect bites, burns and skin eruptions (19).

16. **Common plantain** (*Plantago major*): Common plantain is a common lawn weed. The young leaves are rather bitter and tedious to prepare food. They can be blanched in boiling water before using them in salads in order to make them tenderer. The seeds can be ground into a meal and mixed with flour when making bread, cakes etc. The whole seed can also be boiled and used like sago. The leaves of *Plantago major* are used externally as a healing poultice and treatment for bleeding, quickly staunching blood flow and encouraging the repair of damaged tissue. Internally, they are used in the treatment of a wide range of complaints including diarrhoea, gastritis, peptic ulcers, irritable bowel syndrome, haemorrhage, haemorrhoids, cystitis, bronchitis, catarrh, sinusitis, asthma and hay fever. Plantain seed husks are an excellent treatment for digestive disorders (19).

17. **Bracken** (*Pteridium aquilinum*): Bracken is an extremely invasive plant and is a noxious weed. The plant has a number of edible uses, with the roots and young shoots being eaten. There are also many non-edible uses. For example: glue can be made from the rootstock; the rhizome lathers readily in water and can be used as soap; the roots are rubbed into the scalp in order to promote hair growth; the ashes of the plant are rich in potassium and can be used as a fertilizer. In addition, the leaves are used as a packing material for fruit, keeping it fresh and cool without imparting any colour or flavour. They help to repel insects and can also help to prevent rot in the fruits. It keeps the soil warmer, protects from wind damage and also keeps off some of the rain (19).

18. **Field milk thistle** (*Sonchus arvensis*): Field milk thistle is a common garden weed. The young leaves have a slightly bitter taste but can be added to salads or cooked like spinach. It might be best to remove the marginal prickles before processing for food. The mild flavoured stems can be cooked like asparagus or rhubarb, whilst the roasted root is used as a coffee substitute (19).

19. **Curled dock** (*Rumex crispus*): Curled dock is a perennial plant and a serious weed of agriculture. It is an important food plant for human. The very nutritious leaves can be used in

mixed salads, cooked as a potherb or added to soups. Only the very young leaves should be used, preferably before the stems have developed, and even these are likely to be bitter. The inner portion of the stems is also eaten whilst the seed can be ground into a powder and used as flour for making pancakes etc. When roasted, the seeds are used as a coffee substitute. It is a gentle and safe laxative, particularly useful in the treatment of mild constipation. The plant has valuable cleansing properties and is useful for treating a wide range of skin problems. All parts of the plant can be used, though the root is most active medicinally (19)

20. **Knotweed** (*Polygonum aviculare*): Knotweed is an annual plant and invasive weed of cultivated ground. Young leaves and plants can be used as a potherb, they are a very rich source of zinc. The seeds can be used in all the ways that buckwheat (*Fagopyrum esculentum*) is used, either whole or dried and ground into a powder for use in pancakes and biscuits. Knotweed is a safe and effective astringent and diuretic herb that is used mainly in the treatment of complaints such as bleeding, dysentery and haemorrhoids. It is also taken in the treatment of pulmonary complaints because the silicic acid it contains strengthens connective tissue in the lungs. Recent research has shown that the plant is a useful medicine in the treatment of bacterial dysentery. The plant yields a blue dye that is not much inferior to indigo, whilst yellow and green dyes can also be obtained (19)

21. **Japanese knotweed**: (*Polygonum japonicum* syn. *Polygonum cuspidatum*) is an invasive species that tastes like rhubarb or sour apples when young and tender. As it ages it becomes stringy and the taste is more like corn silk. It also takes on the corn silk flavor upon cooking. But, it is used in many recipes much in the same way Rhubarb is used. The young raw shoots have a refreshing sweet (20).

22. **Kangkong** (*Ipomea aquatica*): Kangkong, is an excellent source of iron and good source of calcium. It is a good source of vitamins B and G, and an excellent source of vitamin C. The leaves are also eaten by fish, and by pigs. The plant contains protein 1.6 per cent, fat 0.2 per cent, and vitamins C3 and B2. Kangkong tops are mildly laxative. It contains an insulin like substance that can be used as a cure for diabetes melitus. Juice is employed as an emetic in cases of arsenical or opium poisoning. Dried latex is nearly equal to scammony in purgative efficiency. It can also be used poultice in cases of fever with delirium, and apply the buds to ringworm (21) .

23. **Green amaranth** (*Amaranthus viridis*): Leaves - cooked as a spinach. The leafy stems and flower clusters are similarly used. The plant is also a good cattle fodder and green manure. The leaves are diuretic and purgative, and are used in poultices (fresh or as dried powder) to treat inflammations, boils and abscesses, gonorrhoea, orchitis and haemorrhoids. In Nigeria an infusion of the whole plant is used to purify the blood and the pounded root is applied against dysentery. Ash of *Amaranthus viridis* plants is rich in soda and is used to make soap. On a zero moisture basis, 100g of leaves contains 283 calories, 34.2g protein, 5.3g fat, 44.1g carbohydrate, 6.6g fibre, 16.4g ash, 2243mg calcium, 500mg phosphorus, 27mg iron, 336mg sodium, 2910mg potassium, 50mg vitamin A, 0.07mg thiamine, 2.43mg riboflavin, 11.8mg niacin and 790mg ascorbic acid. The seed contains 14 - 16% protein and 4.7 - 7% (22, 23) .

24. **Garlic mustard** (*Alliaria petiolata*): It is a herbaceous biennial plant growing from a deeply growing, thin, white taproot that is scented like horseradish. The chopped leaves are used for flavoring in salads and sauces such as pesto, and sometimes the flowers and fruit are included as well. These are best when young, and provide a mild flavour of both garlic and mustard. The seeds are sometimes used to season food directly in France. Garlic mustard was once used medicinally as a disinfectant or diuretic, and was sometimes used to heal wounds (24) .

Conclusions:

In order to secure sustainable food production in the country the importance of conserving these plant genetic resources cannot be overemphasized. For reaching the goal of food production sustainability the following steps should be adopted for immediate action –

1. Thorough weed survey in different seasons should be done in the country to find out the habitats where all these weeds are available.
2. Collection of the species should be done in the form of seeds or other propagules and they should be grown in a well managed herb garden to maintain the germplasm.
3. Research initiatives should be undertaken to find out the appropriate time of planting and harvesting, the level of food productivity and the techniques of seed production of the species.
4. Some projects should also be initiated to commercialize the food products made from the weed PGRFAs.
5. Awareness should be created among the farmers and the inhabitants of the country through different media exposure about the uses and conservation of these weed PGRFAs.

6. Information on these entire weed PGRFAs along with their photographs should be saved in the database system for future reference.

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