Indigenous herbal coolants for combating heat stress in the hot Indian Arid Zone

Suresh Kumar*, Farzana Parveen, Sangeeta Goyal & Aruna Chauhan
Central Arid Zone Research Institute, Jodhpur 342003, Rajasthan

Received 25 August 2006; revised 5 December 2006

In view of continuous hot weather in eight months a year in arid western Rajasthan, desert dwellers have developed strategies to cope excessive heat. These include use of plants as herbal coolant for human body. An appraisal of such herbal coolants in western Rajasthan revealed use of 30 species of angiosperm belonging to 30 genera and 24 families. In the paper, common & botanical names and uses of 30 taxa as herbal coolant has been described.

Keywords: Indigenous knowledge, Herbal coolants, Heat stress, Indian arid zone

IPC Int. Cl.: A61K36/00, A61P17/10

Inconvenience to desert dwellers because of continued prevalence of high air temperature touching 45.5°C during summer is not too difficult to imagine. In fact mean maximum temperature during April-June varies from 38.3°C to 42.9°C and is often 45.5°C. In order to survive such high ambient temperature, inhabitants in desert have evolved combating strategies, including use of local plants in a specific manner. These plants can be called as a ‘coolants’, i.e. their use allows human body to cool down by way of metabolic adjustments, such as recycling of body water or enhances evaporative loss due to increased perspiration and evaporation. These may also reduce intake of high water requiring diets. However, use of wild plants as food and vegetables during famine in the Indian desert has been reported besides their medicinal importance. Though some researchers have cited 25 species of 19 genera and 14 families as sources of food in acute crisis, information about economic and food plants of arid zone did not mention the cooling effect of plants. Life support species as famine foods were reported from 60 species of 44 genera. A detailed account of 116 species belonging to 99 genera and 52 families as a source of household, traditional and commercialized remedies was described from western Rajasthan. Medicinal and miscellaneous uses of plants by Bhils, Nats, Kalbelia and Raikas in Jaisalmer, Jodhpur and Nagaur revealed 78 such species of 71 genera and 42 families. Information on 6 useful species emerging from ethnobotanical surveys by Botanical survey of India, Arid Zone Circle also included information of cooling effects of plants and hence was used as second source to compare with present findings. There have been sporadic attempts in the past and a comprehensive survey and documentation of information on herbal coolants was, therefore, required. The study presents findings of a survey of such plants in western Rajasthan.

Methodology

Extensive survey of vegetation in 11 districts and ethnobotanical investigation in 4 districts, viz. Jaisalmer, Barmer, Jodhpur and Bikaner were carried out. Authentic information on plants used by local villagers for quenching thirst and also having cooling effect was noted during survey. The information was primarily gathered from the village elders conversant with surrounding plants, their local names, parts used and preparation of herbal drink. The plants were collected from the nearby fields, grazing lands and some time from local market and identified. Voucher specimens have been deposited in the Herbarium of CAZRI, Jodhpur. The plants are arranged alphabetically with their botanical name, English name, Hindi name, local name, family, and their uses as coolant. This information was compared with literature on the earlier works and then new information is marked with asterisk (*)

*Corresponding author
Enumeration

The information collected from western Rajasthan revealed that a total of 30 taxa are externally used as coolant, by applying the juice of plant to the body or taking herbal drinks as described below:

**Aegle marmelos** (L.) Correa (Rutaceae)
English: Bael tree, Bengal quince
Local: Bil patar; Hindi: Bilva, Bel
Uses: Fruit pulp drink has cooling effect. Pulp of one fruit is mashed in 1.5 l water and 200 ml is taken once daily.

**Asparagus racemosus** Willd. (Liliaceae)
English: Garden Asparagus
Local: Narkanto, Satawar; Hindi: Satawar
Uses: Two or three fresh tuberous roots are eaten raw once daily to give cooling effect and strength*.

**Boerhavia diffusa** Linn. (Nyctaginaceae)
English: Hogweed
Local: Santi, chinaware; Hindi: Punarnava
Uses: The aqueous extract of root acts as coolant during summer season.*

**Calligonum polygonoides** Linn. (Polygonaceae)
Local: Phog, Phogro; Hindi: Phog
Uses: Aqueous paste of whole plant is given orally to the person who took heavy dose of opium. It gives cooling effect to the body. A dose of 50 gm flower buds in 100 gm curd is effective in sun stroke.

**Citrullus lanatus** (Thunb.) Matsumara & Nakai (Cucurbitaceae)
English: Watermelon
Local: Matira; Hindi: Tarbooz
Uses: Fruits pulp sweet and refreshing. During summer, 250-400 gm of fruit pulp eaten each time cools the body and quenches the thirst.

**Cocculus hirsutus** (Linn.) Diels. (Menispermaceae)
Local: Bajar bel; Hindi: Jamti ki bel
Uses: Paste of leaves applied on forehead and eye lids in the morning have cooling effect and cures headache. Mucilaginous paste of 10-15 leaves in 100 ml water is taken as one cooling dose.

**Corchorus depressus** (Linn.) Christensen (Tiliaceae)
Local: Cham gash; Hindi: Bahuphali
Uses: One tea spoon of dry powder of whole plant is taken orally with goat milk in the early morning to reduce the heat surges felt in the body. Butter oil and wheat floor should be avoided while taking this powder*.

**Crotalaria burhia** Buch - Ham. (Fabaceae)
Local: Shinio; Hindi: Jhamo, Khip
Uses: Roots of one plant boiled in water and its filtrate taken orally, makes a good coolant*.

**Cucumis callosus** (Rottl.) Cong. (Cucurbitaceae)
Local & Hindi: Kachri
Uses: One teaspoonful seeds have cooling action especially in bilious disorders.

**Cyperus rotundus** Linn. (Cyperaceae)
English: Nut grass
Local & Hindi: Motha
Uses: Powder of 2-3 dried bulbs taken with water gives cooling effect.

**Ficus racemosa** Linn. (Moraceae)
English: Cluster fig
Local & Hindi: Gular
Uses: Fruits mashed in 200 ml water, sieved and filtrate with sugar is taken as cooling drink once daily during summer season*.

**Grewia tenax** (Forssk) Fiori (Tiliaceae)
Local: Gangren; Hindi: Gondni
Uses: Handful of fruits eaten by the villagers to quench thirst during summer season*.

**Lepidagathis trinervis** Wall. ex Nees (Acanthaceae)
Local name: Pathar phor buti
Uses: One teaspoonful seeds soaked in water with some sugar and crushed to make up 250 ml of water make a good cooling drink.

**Majorana hortensis** Moench. (Lamiaceae)
English: Sweet majorana
Local & Hindi: Murwa
Uses: 2-3 spoonful seeds soaked in water for 5-6 hours. Mucilaginous water taken with some sugar as coolant.
Maytenus emarginata (Willd.) Ding Hou (Celastraceae)
English: Thorny staff tree
Local: Kankero; Hindi: Baikal
Uses: Fruits used to quench thirst. Ash of leaves used to heal up sores and wound, gives cooling effect.

Mollugo cerviana (L.) Seringe (Molluginaceae)
English: Tel
Local: Chirio ro khet; Hindi: Parpat
Uses: One teaspoonful seeds boiled in water and filtrate taken orally to keep body cool during summer.

Neurada procumbens Linn. (Rosaceae)
Local: Chapari
Uses: 1 teaspoon dried powder of whole plant given with goat’s fresh milk or water early in morning to the patient suffering from heat stroke during summer season. Also a good tonic.

Ocimum americanum Linn. (Lamiaceae)
English: Hoary basil
Local: Bapji, Ramtulsi; Hindi: Vantulsi
Uses: 2-3 teaspoonful seeds soaked in 250 ml water for a few hrs mixed with sugar is taken during summer as a cooling agent. Seeds are also taken with buttermilk in summer for cooling effect.

Opuntia elatior (Willd.) Mill. (Cactaceae)
English: Prickly pear
Local: Hatha-Thor; Hindi: Nagphani
Uses: Pulp of one ripe fruit eaten to cure burning sensation in the stomach to give cooling effect.

Oryza sativa Linn. (Poaceae)
English: Rice
Local: Sawal; Hindi: Chawal, Dhan
Uses: After heavy dose of opium (25 gm), rice grain raw is taken to decrease the temperature of body. Decoction of grains is a pleasant, demulcent refrigerant drink in fever.

Polygonum plebeium R. Br. (Polygonaceae)
Local: Lalbuti
Uses: Decoction of root of one plant taken as cooling agent.

Portulaca oleracea Linn. (Portulacaceae)
English: Common purslane
Local: Luni, Kulfo; Hindi: Khursa

Uses: Fresh leaf juice is an effective thirst quencher. Stem juice is applied externally to relieve prickly heat and cools the burning sensation on hand and feet. Plant sap is applied on the body during scorching heat of summer for relief in blister and boils.

Salvadora oleoides Decne. (Salvadoraceae)
Local: Mitha Jal; Hindi: Bara Pilu, Jhal
Uses: Sweet edible fruit eaten raw has cooling effect.

Sisymbrium irio Linn. (Brassicaceae)
Local: Asalio Hindi: Khubkalan
Uses: One teaspoonful seeds soaked in a glass of water overnight are given to children as a cooling drink during summer.

Tamarindus indica Linn. (Caesalpiniaceae)
English: Tamarind
Local: Aamli, Hindi: Imli
Uses: Juice prepared from 50 gm fruit pulp with jaggery and water is useful in heat stroke and fever. Leaf infusion is effective coolant in bilious fevers.

Trianthem a portulacastrum Linn. (Aizoaceae)
Uses: Juice of young roots gives cooling effect.

Vetiveria zizanoides (Linn.) Nash (Poaceae)
English: Vetiver;
Local: Khas; Hindi: Khas, Gandar
Uses: Roots are crushed in water to make a cooling drink.

Vigna aconitifolia (Jacq.) Marechal. (Fabaceae)
English: Moth Bean
Local & Hindi: Moth
Uses: Tender pods are used as vegetable. Chapatti’s prepared from seed flour is kept on the person’s head to reduce the effect of heat during summer.

Ziziphus nummularia (Burm.f.) Wight and Arn. (Rhamnaceae)
English: Wild jujube
Local: Bordi, Borti; Hindi: Jharberi
Uses: Paste of bark and leaves gives cooling effect on burnt portion. Filtrate of fruit decoction is used to take bath for curing fever caused due to heat stroke during summer.

Of the 30 taxa described of showing cooling effect belonging to 24 families of angiosperms, 20 are perennials and 10 are annuals. Amongst perennial
species, 5 are trees, 6 shrubs, 3 climbers, 3 herbs and one each sedge and grass. Nine herbaceous taxa and one grass constitute 10 annuals. These are eaten either raw or taken as decoction, infusion, juice of plant part or in dried powdered form. Some of the most commonly occurring plants being used as coolant are Salvadora oleoides (fruit), Corchorus depressus, Trianthema portulacastrum, Portulaca oleracea, Convolvulus auricomus, Majorana hortensis, Maytenus emarginata, Sisymbrium irio, Grewia tenax, Asparagus racemosus, Citrullus lanatus, Cucumis callosus, Cocculus hirsutus, Mollugo cerviana, Cyperus rotundus and Lepidagathis trinervis. This analysis reveals possibility of validating same of these as herbal drinks.

The use of 12 species as coolant is being reported for the first time. In addition to the plants mentioned above, some commonly used cooling herbals include juice of unripe mango (Mangifera indica Linn.) mixed with jaggery and salt, known as pana is used to treat heat stroke during summer. Lime water and juice of onion are also used. In remote rural areas of desert neither mango nor lime are available, so their use is restricted only to the urban areas. In remote rural areas, the pulp of Imli (Tamarindus indica Linn.) and butter milk flavoured with roasted cumin powder (Jira) and common salt are very popular as cooling drinks during summer months of April to July. It is pertinent to mention that with onset of rains, vines of Cucumis callosus (Rottl.) Cong and Citrullus lanatus (Thunb.) Matsumara & Nakai spread over all types of landscape. Their fruit become major source of coolant in the month of September-October, which is known as second summer in the desert. Thus herbals as coolants are used as per season of their availability to optimize their utilization. Quantity of a plant used in preparing a dose and frequency of its usage varied from place to place and person to person. It therefore, requires pharmacological validation before actually using them.

Acknowledgement
Authors are thankful to the Director, CAZRI and Head, Division of Natural Resources and Environment, CAZRI for facilities. The financial support from the DST, New Delhi through the DST, Government of Rajasthan is gratefully acknowledged. The local inhabitants of desert regions are also highly acknowledged for providing useful information. Authors also thank the staff of Plant Ecology Section for assistance in field work by Shri Abhay Singh, late Shri Teja Ram and Shri Prema Ram, in computerization of data and typesetting by Shri Harish Purohit and in drawing works by Shri Virendra Harsh.

References
3. King G, Notes on vegetable products used as food during late famine in Rajputana, Tran Bot Soc Edinburg, 10 (1870) 198.