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REVIEW ARTICLE

Black Night Shade (*Solanum nigrum* L.) - An Updated Overview

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ABSTRACT

Solanum nigrum L. (Family Solanaceae; English name: Black night shade) is one of the largest and most variable species groups of the genus. Species belonging to this section are distributed from temperate to tropical regions, and from sea level to altitudes over 3500 metres. Though this species group is often referred to as *Solanum nigrum* complex, the section is composed of a large number of morpho-genetically distinct taxa, which show their greatest diversity and concentration in the New World tropics, particularly in South America. *Solanum nigrum* itself is a predominantly Eurasian species, which does not occur naturally in South America. In most parts of the world, particularly in Europe and North America, these species are considered to be troublesome weeds of agriculture, but in many developing countries they constitute a minor food crop, with the shoots and berries not only being used as vegetables and fruits, but also for various medicinal and local uses.

Key words: *Solanum nigrum*, Black night shade, Solanaceae.

INTRODUCTION

The black nightshades (*Solanum nigrum* L.) are worldwide weeds of arable land, gardens, rubbish tips, soils rich in nitrogen, in moderately light and' warm situations which occur from sea to mundane levels. They are, however, also widely used as leafy herbs and vegetables, as a source of fruit and for various medicinal purposes. Therefore, human consumption of their leaves and fruits as food is widespread, particularly in Africa and SE Asia. Unfortunately, there is also widespread confusion over the precise identification of the taxa involved, especially in those areas in which the species are most commonly used as food sources. This monograph attempts to identify the species related to the black nightshade more accurately, by providing an identification key, descriptions of the taxa most widely reported to be of dietary and/or ethnobotanical use in various Asian, African and Indonesian countries, listing some of the many vernacular names used for the species, recording the precise uses of the various species and giving some information on their genetic resources.

VERNACULAR NAMES:

Australia: Black or black berry nightshade; **Cameroon:** Kumbo (Banso) ; **Ethiopia:** "Dime people eat"; **Europe:** Black nightshade, annual nightshade, common nightshade, garden nightshade, schwarzer Nachtschatten (German), morelle noire (French), Solano nero, solatro (Italian), paslen cernyj (Russian); **New Zealand:** Black nightshade; **South Africa:** Nightshade (Cape Prov.); **Tanzania:** Mwha-ka (Kihehe), Suga (Swahili).

DESCRIPTION:

Plants: Subglabrous to villous annuals up to *70* cm high, covered with simple multicellular hairs with glandular or eglandular heads. **Stems** decumbent to erect. **Leaves** ovate, ovate-lanceolate, ovate-rhombic to lanceolate, 2.5-7.0cm long x 2.0 to 4.5(6.0) cm broad, margins entire to sinuate-dentate. **Inflorescences:** Simple, lax and often extended cymes, (3)5 to 10-flowered; **peduncles** (8)14 to 28 mm fruiting when usually erecto-patent; **pedicels** much shorter, recurved in fruit. **Calyces** 1.2-2.5 mm long, slightly accrescent, deflexed or adhering to base of mature berry, sepals usually ovate. **Corollas** stellate, white with translucent basal star, (4)5 to 7(9) mm radius, usually 1.5-3 times **as** long as calyx. **Anthers** yellow, 1.5 to 2.5(2.8) mm long. **Pollen** (26.6)29.5 to 33.9(35.7) µm diameter. Styles 2.8 to 3.5(4.5) mm long, not exserted beyond anthers. **Berries** usually broadly ovoid, dull purple to

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blackish or yellowish-green, 6-10 mm broad, remaining on plants or falling from calyces when ripe. **Seeds** 1.7-2.4 mm long, (15)26 to 60(96) per berry. **Sclerotic granules** absent.

HISTORICAL DEVELOPMENT:

The species related to *S. nigrum* have been reclassified innumerable times. Characters used by later taxonomists to, separate, and describe additional taxa often differed very slightly from those given for species by earlier workers. Over 300 post-Linnean specific and infraspecific names have now been published, and synonymy is extensive within the section. (Edmonds 1977). However, no satisfactory revision of the whole section has yet been devised. The boundaries between many of the species are still ill-defined, with many of the 'new' taxa proving to be no more than slight morphological variants of those already described. The situation has been further complicated by, a number of authors who have persistently treated different members of the section as belonging to one highly variable species, namely *S. nigrum* (e.g. Tandon and Rao 1966, Fortunately, Ganapathi and Rao 1986) subsequently demonstrated that the Indian plants generaIly described as 'cytotypes' of *S. nigrum* were indeed conspecific with the distinct diploid tetraploid and hexaploid species recognized by western workers, so it is hoped that the correct taxonomic names will now be adopted for the taxa concerned. Phenotypic plasticity These *Solanum* species display varying amounts of phenotypic variation, particularly in their vegetative features such as plant habit, leaf size and form, and stem winging. In addition, senescence is often accompanied by smaller and fewer flowers and fruits than usual, while the gene for anthocyanin pigmentation in flowers seems to be dependent on light intensity and temperature for its expression, in some species. It is therefore often difficult to define the limits within which such features are genetically fixed (Edmonds 1977).

GENETIC VARIATION

In addition, many species exhibit considerable genetic variation, both florally and vegetatively. This variation may occur in different populations of the same species, or may characterize different infraspecific categories of a species. Sometimes, the character may be genetically controlled in one species, but phenotypically plastic in another. Thus leaf margins may vary from entire to sinuate-dentate in different populations of *S. americanum* Mill., *S. furcatum* Dun. and *S. nigrum*, while the different subspecies of *S. nigrum* and S. *villosum* Mill. are characterized by different indumentums types. These two species also display a range of berry colours within each of their subspecies with that in *S. nigrum* varying from green through purple to black, and that in *S. villosum* from yellow through orange to red. Though flower colour is phenotypically plastic in some species, it is under genetic control in others, as in the purple striping on the petals of *S. retroflexum* Dun. for example (Henderson 1974).

POLYPLOIDY

Species belonging to the section constitute a polyploid series, with diploid ($2n=2x=24$), tetraploid ($2n=4x=48$) and hexaploid ($2n=6x=72$) species occurring throughout most of the geographical range in which the section is found. Octoploid plants ($2n=8x=96$) also have been reported on two occasions (Edmonds 1977). Edmonds has made somatic chromosome counts of over 200 accessions of known origin collected throughout the world, and subsequently used experimentally, though not all of these have been published (Edmonds 1977, Henderson 1974). Many other authors have reported counts for small species groups, but some of these are considered to be based on misidentified material. The possibility of determining a rough estimate of ploidy level from herbarium material was discussed in Edmonds (1979). Both pollen diameter and stomata1 length tend to increase with ploidy level, and though pollen sizes are not always directly proportional to chromosome number in these species (Edmonds 1979), if used in association with stomatal length, a good estimate of ploidy level usually can be obtained.

NUTRITIONAL VALUE

Several studies have been conducted to investigate the nutritive value of the 'vegetable black nightshades'; these are summarized (Henderson 1974). From this it is evident that these species constitute nutritious vegetables. The leaves can provide appreciable amounts of protein and amino acids, minerals including calcium, iron and phosphorus, vitamins A and C, fat and fibre, as well as appreciable amounts of methionine, an amino acid scarce in other vegetables. Moreover the berries can apparently yield high mounts of iron, calcium and vitamin B and appreciable amounts of vitamin C and Carotene. The seeds too contain vitamin C and carotene (Watt and Breyer-Brandwijk 1962). The nutrient values may, however, vary with soil fertility, plantage and type for example, found that the leaf protein content of '*S. nigrum*' was dependent on the age of the plant.

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Moreover, the application of nitrogen increases the amount of ascorbic acid and protein while decreasing the calcium content in the leaves. The values of available ascorbic acid depend on the method of cooking. (Watt and Breyer-Brandwijk 1962) observed that ascorbic acid content decreased with both an increase in the cooking time and in the volume of water used for cooking. This loss could reach as much as 75-89% when boiling the vegetable for as long as 20 minutes. However, leaves boiled with six volumes of water for 15 minutes resulted in the loss of approximately 70% of ascorbic acid. Similar reductions in the levels of vitamins A and C through excessive boiling have been reported for various other Nitrates are harmful to humans when consumed and converted into nitrites which oxidize ferrous ions of the blood haemoglobin, resulting in reduced oxygen-carrying capacity of the blood (Lee 1970). Oxalates indicate the presence of oxalic acid in plant material. When ingested by humans, the acid combines with calcium to form an insoluble salt which the body cannot absorb (Watt and Breyer-Brandwijk 1962). This renders the calcium unavailable to the body. Phenolics bind proteins, hence interfering with the assimilation of proteins into the body.

MEDICINAL VALUE

Various parts of many of the species belonging to the section *Solanum* are widely used medicinally throughout the world. Their use as such is recorded from the earliest times and various species, especially *Solanum nigrum,* are mentioned and often illustrated in all of the early Herbals, with Dioscorides being one of the first to record their medicinal properties. Since then this 'species' has continued to be widely acclaimed for its medicinal effects in every country in which the taxon is found. Among the great British herbals, (Lee 1970) reported that the "Nightshade is used for those infirmities that need cooling and binding" and that it was "good against 'St. Anthonies fire', the shingles, panic of the head, heart burning or heat of the stomach". The black nightshade was described as a "cold Saturnine plant", which was commonly used to cool hot inflammations either externally or taken internally. Among the soothing effects of the clarified juice of this plant he mentioned inflamed throats, eye inflammations, shingles, ringworm, running ulcers, testicular swelling, gout and ear pains. In Europe, '*S. nigrum'* has been used as a remedy for convulsions, and has been administered as a soporific in Germany — especially for children, with leaves being placed in babies' cradles to promote sleep in "Bohemia" (? Czech Republic). The bruised fresh leaves used externally are reputed to ease pain and reduce inflammation; they are applied to burns and ulcers by the Arabs. Leaf juice has also been used for ringworm, gout and earache, while it is also reputed to be a good gargle and mouthwash when mixed with vinegar (Grieve 1931). In North America, the Humus Indians use an infusion made from boiled roots of this 'species' to administer to babies with worms, and crushed green leaves mixed with a grease to make poultices for sores, while the Rappahannock's used a weak infusion to cure insomnia. There are relatively few reports of these species being used medicinally in South America, an exception being the moderate narcotic action attributed to flowers and leaves resulting in their use to calm fever and combat the effects of alcoholic excesses in southern Ecuador (Heiser 1963).In India, the 'plant' is noted for its antiseptic and antidysenteric properties and is given internally for cardalgia and gripe. An infusion of the plant is used as an enema for infants with abdominal upsets. The plant is also a household treatment for anthrax pustules when it is applied locally It is further reported to have emollient, diuretic and laxative properties and its decoction is regarded as both antispasmodic and narcotic. Freshly prepared extracts of the plant are apparently effective in the treatment of cirrhosis of the liver and also serve as an antidote to opium poisoning. An alcoholic extract of leaves is active against *Staphylococcus aurens* and *Escherichia coli*. Infusions or decoctions of the plant, after transient stimulation, are reported to depress the central nervous system and the reflexes of the spinal cord. Small doses increase cardiac activity while large doses decrease it. Extracts also reduce blood pressure. Berries apparently possess tonic, diuretic and cathartic properties and are also useful in heart diseases and as a domestic treatment for fevers, diarrhea, ulcers and eye troubles (Grieve 1931). The seeds are reportedly used to treat gonorrhea and dysuria. In Pakistan Akhtar and Muhammad (1989) showed that a powder from the aerial parts of the plant could be "antiulcerogenic". In China leaves are used as a febrifugal or detoxicant drug. Medicinally used preparations consist of dried aerial parts of plants which are used as a diuretic, antihypertensive and anticancer agent for infections of the urinary system, hypertension and cancer of the digestive system (Grieve 1931). Fresh leaves are also used

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to treat wounds. Observed that immature fruits of '*S. nigrum*' contain steroidal glycosides which show considerable anticancer activity. These glycosides could be solasonine, solamargine, diosgenin and solasodine. In Hawaii plants conspecific with *S. americanum* are used in disorders of the respiratory tract, skin eruptions, cuts, wounds and trachoma, while in the Mauritius, a poultice of the plant is used to relieve abdominal pain and inflammation of the urinary bladder (Watt and Breyer-Brandtwijk 1962). Fruits and juices of '*S. nigrum*' are used to cure stomach ailments, fevers and blood impurities and young shoots to cure skin diseases. In the Philippines, leaf extracts are apparently used to restore body skin pigment. In East Africa the raw fruit is chewed and swallowed for treatment of stomach ulcers or for general abdominal upsets which lead to continued stomach-ache. Infusions of leaves and seeds are rubbed onto the gums of children who have developed crooked teeth. Pounded leaves are soaked in water, fermented and used for the treatment of boils, ulcers and swollen glands. Unripe berries are used to treat ring worms. Various parts of the plant are also believed to cure malaria, black fever, dysentery and urinary infection (Watt and Breyer-Brandtwijk 1962). The Zulus use an infusion as an enema for abdominal upsets in children; the southern Sotho rub burnt and powdered root in to scarifications on the back for the relief of lumbago; a paste made from unripe berries is used among African tribes as an application for ringworm; the Xhosa also use the plant for disinfecting anthrax-infected meat; in Zimbabwe the plant is used as a remedy for malaria, black water fever and dysenteries, while the juice or decoctions of the herb were formerly made into an ointment for foul ulcers (Heiser 1963). In Kenya unripe fruits are applied to aching teeth and squeezed onto babies' gums to ease pain during teething. Leaves and fruits are pounded and the infusion used against tonsillitis. Roots are boiled in milk and given to children as a tonic. Indigenous information reported by (Lee 1970) indicates that leaves boiled with milk are used to relieve sudden stomach ache, boost the health of expectant mothers and/or relax the uterus of both pregnant and lactating mothers. The same mixture prevents muscular pains among old people or those suffering painful joints, especially those associated with arthritis or with malarial fever. Furthermore, the same mixture is believed to increase the strength of weak people and prevent skin eruptions. Notes taken from herbarium specimens confirmed that these nightshade species are widely used medicinally in Africa. Thus *S. americanum* was found to be used for the treatment of sores (using pounded leaves) in the Cameroon, for rheumatic pains (leaf infusions) in Kenya; as a cold cure (chewed roots) and an eye-disease remedy (leaf juice mixed with salt) in Hawaii; for heart pains (raw leaves) in Sierra Leone; and for inflamed eyes, especially for conjunctivitis (fresh leaves pounded and juice sprayed into infected eyes) in Tanzania. Raw roots of *S. nigrum* were also found to be eaten for stomach-ache in Tanzania, where ground and soaked leaves of *S. villosum* were reportedly placed on swellings and fruit juice squeezed into sore eyes. The report of a case of conjunctivitis in Tanzania which had failed to respond to conventional treatment administered over a week is particularly interesting; the pain was instantly relieved and all inflammation disappeared within 4 days when treated with a leaf juice extract from *S. americanum.* Recent reports attribute antitumor and anticancer effects to herbal extracts of the Chinese '*S. nigrum*'.(Boik 1996) reported such extracts to have inhibited SA, WA ascites cancer and cervical cancer in mice, as well as suppressing the growth of meningeal tumor cells, inhibiting Hela cells and ascitic SA in mice. Of more importance, these extracts were also reported to reduce the signs and symptoms of carcinomas of the cervix, esophagus, breast, lung, liver and ovary chorioepithelioma, hematoma and sarcoma in humans. Though the accuracy of this information is uncertain, in view of the crudeness of the herbal preparations used and the results observed, such potential value clearly deserves further investigation.

COMMERCIAL VALUE

Both the leaves and berries are used as a source of dyes. Leaves are macerated to extract a dye used to color sisal baskets (Nzioka 1994), while the purple/black berries of both *S. scabrum* and *S. americanum* are reportedly used as a source of ink. The anthocyanin pigments of *S. scabrum,* moreover, are used as a colorant for fruit juices and apple sauce (Boik 1996). These authors consider that this species is a particularly useful source of colorants, because the pigment is present in high concentration, and the plants are vigorous and easy to grow. Molluscidal activity indicates that extracts from these plants might also be of use in mollusk control (Shoeb *et al.* 1990).

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RURAL AND URBAN ECONOMIC VALUE

These *Solanum* species are found on sale as a vegetable in both rural and urban markets in Africa, especially in Cameroon, Ghana, Kenya, Madagascar and Nigeria, as well as in Guatemala, New Guinea and the Mediterranean (e.g. Crete). (Nzioka 1994) further report that the 'black nightshade' is also sold in the markets of Hawaii, Trinidad, Suriname, India, Indonesia, China and the Philippines. The plants therefore provide a source of income for rural farmers, who are mostly women. In some districts of South Africa Zulu women often take baskets of berries to sell in nearby villages or townships. Both the vegetative shoots and the fruits are probably harvested casually as weeds of other crops. There are very few reports of controlled cultivation for any of these species, apart from those noted on herbarium sheets for the Seychelles and Zambia, or those reporting that the plants are encouraged at the edges of cultivation in parts of Kenya. Economic returns from the use of these *Solanum* as a vegetable have not yet been quantified, though (Shoeb *et al.* 1990) reported that the 'black nightshade' has a low market price and a low economic' value in those countries in which it is sold as a market crop.

WEEDS OF AGRICULTURE AND HORTICULTURE

Species related to the black nightshade are notorious and often troublesome weeds of agriculture and horticulture in most parts of the world. They are recorded as occurring in at least 73 countries where they are associated with 37 major crops (Lee 1970) Including it among the world's worst weeds, (Shoeb *et al.* 1990) describe '*S. nigrum'* as being a serious weed of crops as diverse as banana, barley, cereals, coffee, corn, cotton, field bean, garlic, lima bean, melon, onion, orchards, pea, pepper, pineapple, potato, sorghum, soybean, sugar beet, sugarcane, sunflower, tobacco, tea, tomato, vineyards, wheat and vegetables, and in countries as widespread as Asia, Australia, Europe, the Middle East, New Zealand, North and South America and the Pacific Islands. Not only do these *Solanum* compete with the crops for moisture, light and nutrients, but they can also contaminate a commercial crop such as field bean, lima bean, soybean and navy bean through staining from the juice released by the berries rupturing during harvesting; this greatly reduces both the quality and economic return to growers (Watt and Breyer-Brandtwijk 1962). They can even stain wool when sheep graze infested land after crop harvesting (Boik 1996). So-called *S. nigrum* or related species are included in most accounts of weeds or troublesome plants throughout the world. Interestingly, however, Africa, India, Malaysia and South America are all excluded from the distribution map given of areas in which this so-called species is a common, serious or principal weed (Holm *et al.* 1977). It is principally in these areas that species related to *S. nigrum* have been recorded as being used a minor crop. It is highly possible that their use as such, which must result in their being hand-weeded out of the crops concerned, simultaneously results in the prevention of these species becoming troublesome or contaminating the actual commercial crops being grown. Moreover, (Boik 1996) reported that none of these *Solanum* species found in India and Pakistan were weeds of significant agronomic importance, except under irrigation and then only in localized areas. Nevertheless, these species do feature in various African, Asian and Malaysian accounts of weeds.

CULTIVATION

These species are only semicultivated in a few countries in Africa and Indonesia, and are largely utilized as a vegetable and fruit source through harvesting from plants growing spontaneously as weeds in cultivated fields, or in weedy plant communities, under trees, along fences and roads, in shaded areas, near buildings and on waste land. They therefore constitute a volunteer crop. Some communities' semicultivate the vegetable in home gardens or on fertile land portions near homesteads. There are a few reports of the cultivation of the garden huckleberry for its fruits in North America; Fisher (1977), for example, considered that this species (i.e. *S. nigrum)* was an excellent fruit crop for growing on small areas of land or in 12-inch (about 30-cm) pots filled with "good rich soil".

TOXICITY

Most species associated with *Solanum* section *Solanum* are reputedly poisonous to both humans and livestock; many of the reports of their toxic effects are reported in the older literature. Indeed, nearly every manual on poisonous plants in every geographical region of the world includes *S. nigrum.* The widely reported toxicity of *S. nigrum* has been attributed to the alkaloid solanine causing varying degrees of poisoning in humans, cattle, pigs, goats, ducks and chickens, with death resulting in some cases. The effects of solanine poisoning in humans are reported to be nausea, vomiting, diarrhoea, colic, headache, dizziness,

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loss of speech, fever, sweating and tachycardia, reduced heartbeat, pupil dilation, blindness, mental confusion, convulsions, coma and death (Watt and Breyer-Brandwijk 1962). Such effects normally appear around eight hours after ingestion. In animals, such ingestion can cause rapid pulse and respiration, dark-coloured diarrhea followed by constipation, lack of rumination, somnolence and dry muzzle in cattle, pale mucous membranes, widely dilated pupils, low body temperature, oedema, incoordination, tremors and staggering movements (Cooper and Johnson 1984). However, the level of solanine, the toxin responsible for these effects, is apparently reduced if animal forage contaminated with *S. nigrum* is ensiled; the resultant fermentation process probably converts the sotanine to the less toxic sotanidine by acid hydrolysis (Ganapathi and Rao 1986). These plants also contain high levels of nitrate nitrogen (NO3-N) and are included in the group of plants which can cause N03-N toxicity in livestock. The levels of NO3-N apparently reach a peak as the plants come into flower and then decline. Acute nitrate toxicity can lead to death, with chronic toxicity resulting in a decrease in milk yield, abortion, impaired vitamin A and iodine nutrition, muscle tremors, staggering gait, rapid pulse, frequent urination, labored breathing, followed by collapse and coma, with or without convulsions. However, the level at which this nitrate toxicity can cause detrimental effects in animal health and production is uncertain, while the actual effects noted following ingestion of black nightshade plants could be due to either solanine or N03-N or both (Lee 1970). Nevertheless, the comparable number of accounts reporting that these species are harmless as a food and fodder sources suggest that this toxicity is variable. Indeed a chemical survey of various members of the section *Solanum* reported the presence of potentially toxic alkaloids only in unripe fruits, with ripe berries and vegetative parts tacking these compounds. Schilling *et al.* (1992) therefore concluded that the plants are probably only poisonous to indiscriminate feeders such as livestock who might consume the whole plant. However, these plants are browsed and used as fodder for animals without any detrimental effect in some areas, (Edmonds 1979) suggested that the development of toxic levels of these alkaloids is dependent on their growth under certain conditions or in certain localities, and even on the age of the plants concerned. Other reports suggest that the amounts of poisonous 'principles' vary greatly with climate, season and soil type (Cooper and Johnson 1984). It is highly probable that boiling destroys any toxicity inherent in these species; most ethnobotanical reports of their use as vegetables refer to cooking, boiling and even repeated boiling with the liquid being discarded; similar reports of the use of berries also refer to their being poisonous when uncooked or unripe. Drying, however, does not destroy the toxicity of the solanine-type alkaloids. It is these glycosidal alkaloids which are responsible for the bitter taste often associated with these *Solanum*.

CHEMICAL CONSTITUENTS OF THE SPECIES

The occurrence of steroidal alkaloid solasodine and of solasodine-like alkaloids in most species belonging to the genus *Solanum* has resulted in a number of phytochemical surveys of various taxa from different geographical regions throughout the world. The toxicity and/or medicinal effects of these plants are generally attributed to these glycoalkaloids. Those so far identified in the black nightshade include solanine, solasonine, solamargine and chaconine (Cooper and Johnson 1984). Solanine is found in all parts of the plants, with the level increasing as the plant matures, though it is apparently modified by soil type and climate. The most comprehensive study dealing with species belonging to the section *Solanum* was carried out by Carle (1981) who analyzed plant material from 55 strains representing 32 so-called species for both steroidal alkaloids and the biogenetically closely related steroidal sapogenins. He demonstrated that the characteristic steroidal alkaloid solasodine was absent from plant material of all these samples, though it was present in their unripe fruits. However, the steroidal sapogenins, identified as diosgenin and tigogenin, were universally present though not always together, in both the vegetative parts and the unripe berries. The importance of these substances ties in their potential use as raw materials for the industrial production of hormonal steroids. Of particular interest is the identification of diosgenin which is highlysought after as an alternative to that derived from *Dioscorea* (Cooper and Johnson 1984). earlier reported significant amounts of diosgenin (1.2%) and solasodine (0.65%) in green berries of the Indian diploid *'S. nigrum'* (=*S. americanum)* with lesser amounts of both chemicals in the Indian tetraploid (=*S. villosum)* and hexaploid (=*S. nigrum)* species. Carle (1981) had also found solasodine in all parts of *S. americanum*, but

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advocated that since the highest concentration occurred in the green berries, these might be a suitable source of solasodine for steroid hormone synthesis. All authors reported that these compounds are present in the greatest concentrations in green (i.e. unripe) berries, and that the actual concentration can be very variable and can vary according to the stage of plant development, as well as being affected by genetic, seasonal, edaphic and environmental factors. So far, few attempts have been made to isolate and identify the various chemicals responsible for the medicinal effects observed in species belonging to *Solanum* section *Solanum.* The little work done on glycoalkoloids, which are said to be responsible for anticancer activity, indicated that solasonine and solamargine, from leaves and unripe fruits, are the two most important. The ripe fruit of *S. americanum* is said to contain 0.3-0.45% of solasonine (Watt and Breyer-Brandwijk 1962). Solasonine concentrations are reported highest during fruiting white solamargine is Various other chemicals have been identified in species associated with the section *Solanum.* Fresh leaves of S. *nigrum* are said to contain 1 mg/100 g of ascorbic acid (Watt and Breyer-Brandwijk 1962). The flavonols have been widely analyzed for their use as indicators of phylogenetic relationships in the Solanaceae, both within and between various generic sections. Schilling (1992) isolated 10 flavonoids from leaf extracts of 11 species belonging to the section *Solanum;* they were all flavols with the predominant glycosidic moiety being glucose. Other chemicals identified include coumarins (such as scopoletin), flavonols and anthocyanidins for *S. scabrum* in Nigeria (Carle (1981) and the anthocyanin pigments found in European samples of this species. The tatter authors found that the major pigment (93%) in the berries of this species was petanin (petunidin-3-(p-coumaroyl rutinoside)-5-glucoside) with minor pigments constituting the remainder. There are also various reports of the anthocyanins responsible for the purple/black berry colouration and the carotenoids responsible for the red/orange/yellow berry colouration, but these are mostly concerned with the inheritance of these characters rather than their biochemical analyses. However, identified the anthocyanin pigment present in the Indian forms of both *S. nigrum* and *S. americanum* as “petunidin3-(p-coumoryl) rhamnosyl glucoside”. stature and potential berry set of a plant of *S. nigrum* collected in Corfu, Greece, with that of the plants subsequently grown from the original seeds in cultivation in England is clearly evident. This difference in stature and fertility between the original collections and those subsequently grown on experimental field plots was continually encountered, regardless of the species concerned.

CONCLUSION

Keeping in mind that herbal medicines are gaining and growing interest because of their cost effective and eco-friendly attributes, this is an urgent need to meet the ever growing demand of medicinal plants in the market and will pose a challenge for researchers, farmers, conservationist and policy makers to manage and use our natural resources wisely. The updated overview on *Solanum nigrum* is in light of it.

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