NAPPO

ORGANISATION NORD-AMERICAINE POUR LA PROTECTION DES PLANTES
NORTH AMERICAN PLANT PROTECTION ORGANIZATION
ORGANIZACION NORTEAMERICANA DE PROTECCION A LAS PLANTAS

PEST FACTS SHEET

Commelina benghalensis L.

An introduced, annual or sometimes perennial herb, *Commelina benghalensis* is reported as a serious and troublesome weed in many arable crops in Eastern and Southern African countries, but it appears to be a problem only sporadically in the Americas. No records have been located for this weed in Canada or Mexico and it is known only from California, Florida, Georgia, Hawaii and Louisiana in the US. There is relatively little mention of this weed in cereal crops, and, as it is a weed of the tropics and subtropics, preferring warm moist soils, the risk of its movement via the cereal grains pathway in North America may be quite low.

Preferred Scientific Name *Commelina benghalensis* L.

Other Scientific Names *Commelina benghalensis* L. var. *hirsuta* C.B.Clarke
Commelina canescens Vahl
Commelina cucullata L.
Commelina delicatula Schltdl.
Commelina kilimandscharica K.Schum.
Commelina mollis Jacq.
Commelina nervosa Burm.f.
Commelina procurrens Schltdl.
Commelina prostrata Regel
Commelina turbinata Vahl

Common Names English - benghal dayflower, tropical spiderwort, wandering jew
Bangladesh - kanaibashi
Taiwan - ju-ye-tsai
Indonesia - gewor
India - kanasiri, kanchara, kankaua, kena, konasimalu, krishnaghas, mankawa
Japan - tsuyukusa
Myanmar - myet-cho
Philippines - alikbangon, bias-bias, kuhasi, kulkulasi, sabilau

Notes on Taxonomy and Nomenclature

Populations of *C. benghalensis* represent several clones, as propagation is both vegetative and sexual (Vernon 1983, Terry 1983, Drummond 1984, Chivinge and Kawisi 1989).

Habitat

Commelina benghalensis is an annual or perennial herb with fleshy creeping stems that root readily at the nodes. It is equally abundant on all soil types and pH, growing in a wide range of habitats, varying from saturated to dry soils.
Found in short rotations and in plantation crops, and on non-crop lands, under optimum conditions it will grow rapidly and forms dense mats at the nodes.

Distribution List

Asia

Arabia (USDA, ARS 2003)
Bangladesh - restricted distribution (Holm *et al.* 1977, EPPO 2002)
Bhutan (Parker 1992)
China - restricted distribution (Ciba Geigy 1982, EPPO 2002)
Hong Kong (Holm *et al.* 1979)
Taiwan - restricted distribution (Holm *et al.* 1977, EPPO 2002)
India - restricted distribution (Holm *et al.* 1977, EPPO 2002)
Indochina (USDA, ARS 2003)
Indonesia - restricted distribution (Holm *et al.* 1977, Waterhouse 1993, EPPO 2002)
Kalimantan (Holm *et al.* 1979)
Israel (Wilson 1981)
Japan - restricted distribution (Holm *et al.* 1977, EPPO 2002)
- Honshu (USDA, ARS 2003)
- Kyushu (USDA, ARS 2003)
- Shikoku (USDA, ARS 2003)

Korea, Republic of (Ciba Geigy 1982)
Malaysia - restricted distribution (Wilson 1981, Waterhouse 1993, EPPO 2002)
Myanmar (Holm *et al.* 1977, Waterhouse 1993)
Nepal (USDA, ARS 2003)
Pakistan (USDA, ARS 2003)
Philippines - restricted distribution (Holm *et al.* 1977, Waterhouse 1993, EPPO 2002)
Singapore (Wilson 1981)
Sri Lanka - restricted distribution (Holm *et al.* 1977, EPPO 2002)
Thailand - restricted distribution (Holm *et al.* 1977, Waterhouse 1993, EPPO 2002)
Vietnam - restricted distribution (Waterhouse 1993, EPPO 2002)

Europe

Russian Federation (Shcherbakova 1974)

Africa

Angola - restricted distribution (Holm *et al.* 1977, EPPO 2002)
Benin (USDA, ARS 2003)
Botswana (Ciba Geigy 1982)
Cameroon (Brenan 1968)
Congo Democratic Republic (Brenan 1968)
Côte d'Ivoire - restricted distribution (EPPO 2002)
Djibouti (USDA, ARS 2003)
Ethiopia (Terry & Michieka 1984)
Gambia (Holm *et al.* 1977, Terry 1981)
Ghana - restricted distribution (Holm *et al.* 1977, Carson 1977, EPPO 2002)
Guinea - restricted distribution (EPPO 2002)
Kenya - restricted distribution (Holm *et al.* 1977, EPPO 2002)
Lesotho (Ciba Geigy 1982)
Madagascar - restricted distribution (Wilson 1981, EPPO 2002)
Malawi (Banda & Morris 1985)
Mauritius - restricted distribution (Holm *et al.* 1977, EPPO 2002)
Mozambique - restricted distribution (South African Sugar Association 1972, EPPO 2002)
Namibia (Wilson 1981)
Nigeria - restricted distribution (Holm *et al.* 1977, Wilson 1981, EPPO 2002)
Rwanda - (Terry & Michieka 1984)
Senegal - restricted distribution (Wilson 1981, EPPO 2002)
Sierra Leone (Brenan 1968)

Somalia (Terry & Michieka 1984)
South Africa - restricted distribution (Holm *et al.* 1977, EPPO 2002)
Cape Province (USDA, ARS 2003)
Natal (USDA, ARS 2003)
Orange Free State (USDA, ARS 2003)
Transvaal (USDA, ARS 2003)
Swaziland - restricted distribution (Holm *et al.* 1977, EPPO 2002)
Tanzania - restricted distribution (Holm *et al.* 1977, EPPO 2002)
Togo (Brenan 1968)
Uganda - restricted distribution (Holm *et al.* 1977, EPPO 2002)
Zambia - restricted distribution (Wilson 1981, Vernon 1983, EPPO 2002)
Zanzibar (Wilson 1981)
Zimbabwe - restricted distribution (Chivinge 1983, Drummond 1984, EPPO 2002)

North America

USA
Hawaii (Holm *et al.* 1979, EPPO, 2002)
California (USDA, NRCS 2002)
Florida (USDA, NRCS 2002)
Georgia (USDA, NRCS 2002)
Louisiana (USDA, NRCS 2002)

Central America

Barbados (Adams *et al.* 1968)
Jamaica (Adams *et al.* 1968)
Saint Kitts and Nevis - restricted distribution (EPPO 2002)
Windward Islands (Hammerton 1981)

South America

Argentina (Wilson 1981)
Brazil (Ciba Geigy 1982)

Oceania

Australia - restricted distribution (Ciba Geigy 1982, EPPO 2002)
Micronesia (USDA, NRCS 2002)
Papua New Guinea (Wilson 1981)

Distribution Notes

C. benghalensis is a weed of the tropics and subtropics, widely distributed in West Africa, East Africa, Central, Southern and South-East Asia extending as far as Japan, the Philippines and Australia (Drummond 1984, Holm *et al.* 1977). It is reported as a serious and troublesome weed in most arable crops in Eastern and Southern African countries, but only sporadically in the Americas. No records have been located for this weed in Canada or Mexico.

Biology and Ecology

Commelina benghalensis is a fleshy, herbaceous, creeping annual which becomes perennial depending on moisture conditions. It is found in wet and dry lands making it a troublesome weed in arable and plantation crops. It grows best in moist and highly-fertile soils. Stems have a high moisture content, and once well rooted the plant can survive for long periods without moisture availability (Wilson 1981) and can then grow rapidly on the onset of rains (Holm *et al.* 1977). It reproduces both by seeds and vegetatively, spreading by runners which root at the nodes and by re-establishment of stem fragments. Additionally, underground stolons can give rise to cleistogamous flowers and seeds along with the production of normal aerial flowers (Budd *et al.* 1979).

A single plant can produce about 1600 seeds (Pancho 1964). Freshly shed aerial seeds have a dormancy controlled by an impermeable seed coat, but it is broken down following scarification or pricking of the seed. Aerial seeds germinate mainly within the upper 5 cm of soil, while the larger subterranean seeds may emerge from depths to 14 cm (Budd *et al.* 1979). The same authors found that a majority of seedlings in the field in Zimbabwe were derived from subterranean seeds. However, Walker and Evenson (1985a, b) concluded that the aerial seeds were more important to survival in Queensland, Australia. They also distinguished large and small classes of seed within the aerial and subterranean groups, and showed each of the four classes to have characteristic germination behavior. Subterranean seeds had a more pronounced light requirement for germination and a higher optimum germination temperature.

The rate of stem elongation, branch and leaf formation increases as the node number on the stem increases (Chivinge and Kawisi 1989). Broken stems may persist on the soil surface for several weeks or months in low moisture conditions and will easily form leaves 10-14 days after moisture becomes available. Though stem cuttings on the surface regenerate easily (Chivinge and Kawisi 1989), cuttings buried deeper than 2 cm fail to regenerate (Budd *et al.* 1979).

Crops are affected most severely during the first 2 - 5 weeks of crop growth, but mature plants can also be affected (CABI 2002).

Economic Impact

C. benghalensis is reported as a principal weed in upland rice in India and the Philippines, tea in India, coffee in Tanzania and Kenya, soybeans in the Philippines and cotton and maize in Kenya (Holm *et al.* 1977). It is also a common weed in rice in Sri Lanka, sugarcane in India, the Philippines and Mozambique; cassava in Taiwan; maize in Zimbabwe (Chivinge 1983), Angola, India, the Philippines and Taiwan; peanuts in Zimbabwe, India and the Philippines; pineapples in Taiwan and Swaziland; cowpeas and sorghum in the Philippines; tea and citrus in Mozambique and roselles in Indonesia; cotton in Zimbabwe (Chivinge 1988). It is a weed of barley, jute, sisal, beans, pastures, sweet potatoes, vineyards and cereals in many countries (CABI 2002).

Other crops recorded as being affected by *C. benghalensis* include, *Agave sisalana* (sisal hemp), *Ananas comosus* (pineapple), *Arachis hypogaea* (groundnut), *Brassica napus* var. *napus* (rape), *Camellia sinensis* (tea), *Capsicum frutescens* (chilli), *Citrus limon* (lemon), *Citrus sinensis* (navel orange), *Coffea arabica* (arabica coffee), *Corchorus olitorius* (jute), *Glycine max* (soybean), *Gossypium hirsutum* (Bourbon cotton), *Guizotia abyssinica* (niger), *Ipomoea batatas* (sweet potato), *Lycopersicon esculentum* (tomato), *Manihot esculenta* (cassava), *Momordica charantia* (balsam apple), *Musa* (banana), *Oryza sativa* (rice), *Phaseolus vulgaris* (common bean), *Prunus armeniaca* (apricot), *Prunus persica* (peach), *Saccharum officinarum* (sugarcane), *Sorghum bicolor* (common sorghum), *Vigna radiata* (bean, mung), *Vigna unguiculata* (cowpea), *Vitis vinifera* (grapevine), *Zea mays* (maize) (CABI 2002).

The economic importance of *C. benghalensis* is related to its persistence in cultivated lands and the difficulty associated with its control. *C. benghalensis* seriously competes with arable and plantation crops in most of Africa. It is one of the troublesome weeds which affects several crops in Eastern and Southern Africa, sugarcane in the Philippines, maize in India, Indonesia, the Philippines and Taiwan and pineapples in Taiwan and Swaziland.

The effect of the presence of *C. benghalensis* on crop growth and yield varies with each crop and with environmental conditions. Groundnut flower production may be delayed by 1 - 2 weeks and nodules are also reduced depending on the intensity of infestation. Control of this weed in India increased groundnut yield by 27% (Mehrotra and Singh 1973).

The plant is used for medicinal purposes by many African tribes for treating sore throats, eyes and burns. In India and the Philippines the weed is used for food during famine periods.

Morphology

C. benghalensis belongs to a family with 500 - 600 species with distinct characteristics. *C. benghalensis* has

creeping stems which assume an ascending position, are 15 - 40 cm long, branched and rooting at the nodes. The leaves are ovate or elliptical, acuminate, 3 - 7 cm long, 1 - 2.5 cm wide with a base narrowed into a petiole. The flowers are subtended by bracts with their edges fused to a length of about 10 mm to form a flattened funnel-shaped spathe, 1.5 cm long and wide. Flowers have three lilac blue petals 3 - 4 mm long, the lower rather smaller than the two laterals and occasionally white. There are two anterior cells which are two-ovuled. The fruit consists of a pear-shaped capsule with five seeds and the capsule open when mature(dehiscent). Seeds which sometimes appear sugar-coated are 2 mm long, ribbed-rough (rugose) and greyish brown in colour. *C. benghalensis* produces white underground rhizomes with reduced leaves and closed modified flowers which produce subterranean seeds. These seeds are fewer but remain viable longer than the aerial ones. The species is distinguished from others by the blue flowers, the short flower stalk which does not extend above the spathe, the partially joined spathe margins and the reddish brown hairs on the leaf sheath (Ivens 1967, Holm *et al.* 1977, Drummond 1984).

Similarities to other species/conditions

Confusion can occur with a number of other weedy *Commelina* species, but the following combination of characters may be used to distinguish *C. benghalensis*: all three petals blue, leaves broadly elliptical (length up to twice width only), spathe sealed to form triangular pocket, seeds rugose, presence of stolons, leaf sheaths with reddish-brown-tipped hairs. *C. diffusa*, the commonest of other species, has blue petals, but the spathe open along one edge, leaves are narrower, seeds are smooth, and there are no stolons. *C. forskalaei* has stolons and rough seeds, and the spathe is sealed, but the leaves are narrower, and their length is up to 4 times the width, and wavy-edged (Holm *et al* 1977, Drummond 1984). None of the other weedy species have brown-tipped hairs. Hence this is an especially useful character when looking at vegetative material.

Control

Cultural Control

The method of control depends on the crop infested, land size, level of technology available, value of the crop, labour availability and costs, availability of draft power and the associated equipment and availability of herbicides. The methods currently used include proper land preparation, hand hoeing and pulling, removing the plants from the fields and drying, use of ox-drawn and tractor-drawn cultivation, slashing and herbicide application. However, mechanical control and hand hoeing and pulling are not very effective as the cut stems quickly regenerate into new plants, especially in wet conditions (Chivinge and Kawisis 1989). When plants are rogued they should be shaken to remove all the soil, spread and left to dry for more than a week. Walker and Evenson (1985a) emphasize the importance of growing crops which will smother the weed as quickly as possible. Le Bourgeois and Marnotte (1997) emphasize the need to control the weed when young but also list some new herbicides under test in maize.

Fertilizer application reduced seed production of *C. benghalensis* and resulted in stunted growth when grown under artificial dense competition in cereals in Russia (Shcherbakova 1974).

Chemical Control

In a review by Wilson (1981) it is noted that *C. benghalensis* is relatively difficult to control using herbicides, especially when well established. However, young plants in cereal crops are susceptible to 2,4-D and related herbicides. Bentazon is useful in both cereals and in some broad-leaved crops such as soybean. Among pre-emergence treatments, metribuzin is especially effective, e.g. in sugarcane and soybeans while substituted urea, triazine, acetanilide and dinitroaniline treatments, alone or in combinations, give variable results. In plantation crops and non-crop situations, paraquat is relatively ineffective but glyphosate is effective on younger plants, especially with the addition of surfactant or other additives such as 2,4-D or ammonium sulphate.

Biological Control

There have not been any attempts to use biological control against *Commelina* spp. and the possibilities have not been explored. However, Waterhouse (1994) notes that although *Commelina* spp. are believed to be of Old World

origin, it is curious that there are no records of agromyzid leaf miners, except from the Americas, and therefore tropical and subtropical areas of the Americas may be promising sources of candidate biological control agents.

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[1]Although many references were reviewed for this Pest Fact Sheet, the primary basis for it's construction has been modeled upon a "full datasheet" as provided by CABI (2002) and referenced below.

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