

The genus *Medicago* (Leguminosae) in southern Africa

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ABSTRACT

Four species of *Medicago* have become naturalized in southern Africa: *M. laciniata*, *M. polymorpha*, *M. sativa* and *M. lupulina*. Their morphological variation and geographical distribution is discussed and a key is provided.

The genus *Medicago* is probably known to most readers from an acquaintance with lucerne, *Medicago sativa* L. This crop is the modern day 'King of forages', especially so in southern Africa where it is widely cultivated.

Representatives of the genus have been widely dispersed around the globe during the last two hundred years and today occupy important niches either as crops or weeds. Their weediness has much to do with their predominantly self-breeding and annual habits, some 75% of all species being annuals. These two features have allowed the expression of widespread variation especially at the infraspecific level. This, combined with known instances of polyploidy, has been the cause of much taxonomic confusion.

Diploids, tetraploids and hexaploids have been shown to occur in *Medicago* (Lesins & Lesins, 1980). Most of the diploids are of the $2n = 16$ type, with a basic chromosome number of $x = 8$. Four species of diploids have $2n = 14$ chromosomes and one has members with $2n = 16$ and $2n = 14$. The importance of ploidy in the evolution of *Medicago* has been discussed by Lesins & Lesins (1980) in their taxogenetic investigation of the genus. As I have not investigated ploidy in the four naturalized species of *Medicago* treated in this survey, such an investigation will be necessary when the infra-specific categorization of the South African 'naturalants' is studied in the future. It will be important in such a study to be aware of the Australian experience (McComb, 1974) where it was found that some forms of Medics did not always show the same range of characteristics for the species as a whole, as in

Heyn (1963). Such is the case in southern Africa. For example, in *M. laciniata* (L.) Mill. the var. *laciniata* is generally separated from var. *brachyacantha* Boiss. as follows (McComb, 1974):

Burrs with 5-8 coils, olive-shaped or globular, peduncle longer than the petiole, stipules laciniate, at least some leaves laciniate var. *laciniata*
 Burrs with 3-4½ coils, cylindrical, peduncle shorter than petiole, stipules incised, leaves dentate var. *brachyacantha* Boiss.

This key breaks down in southern Africa. Specimens here range from markedly laciniate-leaved forms with peduncles shorter than the petioles to specimens with large many-coiled burrs and petioles longer than the petiole.

Rather than attempt a classical morphological analysis of the infraspecific categories, an unsatisfactory approach for such levels anyway, it was decided to defer such a study until the plants could be investigated cytologically and ecologically. However, as *M. polymorpha* L. var. *brevispina* is distinctive enough it is recognized accordingly.

Four species of *Medicago* have become naturalized successfully in southern Africa: *M. sativa* L., *M. lupulina* L., *M. laciniata* (L.) Mill. and *M. polymorpha* L. Other species have also been grown in South Africa but have not persisted in the wild. These include *M. arabica* (L.) Hudson, *M. arborea* L., *M. falcata* L., *M. intertexta* (L.) Mill., *M. orbicularis* (L.) Bartalini, *M. scutellata* (L.) Mill and *M. turbinata* (L.) All.

The three keys provided below appertain to the four naturalized species and are based on vegetative, floral and fruit characters respectively.

1. KEY TO SPECIES BASED ON MATURE BURRS

- Burrs smooth or with small tubercles:
 - Burrs single-seeded, black, with only the distant end coiled *M. lupulina*
 - Burrs many-seeded, brown, coiled along the full length:
 - Burrs smooth, veins emerging obliquely from the ventral suture, branching somewhat, then anastomosing in the outer part of the coil face *M. sativa*
 - Burrs tubercled, with 6-10 prominent curved veins anastomosing freely before joining the lateral vein *M. polymorpha* var. *brevispina*
- Burrs spiny:
 - Burrs with partitions between the seeds *M. polymorpha*
 - Burrs without partitions between the seeds *M. laciniata*

2. KEY TO SPECIES BASED ON FLOWERING PLANTS WITHOUT MATURE BURRS

- Corolla purple, mauve or pale lilac *M. sativa*
- Corolla yellow or golden:
 - Flowers 10-30, peduncle $> 2 \times$ the petiole of the subtending leaf *M. lupulina*
 - Flowers 1-10, peduncle $< 2 \times$ the petiole of the subtending leaf:
 - Calyx teeth longer than the tube, wing petals longer than keel *M. polymorpha*
 - Calyx teeth shorter than the tube, wing petals shorter than the keel *M. laciniata*

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3. KEY TO SPECIES BASED ON VEGETATIVE PARTS

Stipules deeply incised or laciniate:

- Central leaflets 4–6 mm wide, lower side of stipules covered in simple hairs *M. laciniata*
 Central leaflets 7–15 mm wide, lower side of stipules glabrous or with a few hairs along the margin
 *M. polymorpha*

Stipules entire or irregularly toothed:

- Margin of leaf slightly toothed in upper part *M. lupulina*
 Margin of leaf serrate in upper part *M. sativa*

1. *Medicago laciniata* (L.) Mill., Gard. Dict. edn 8, *Medicago* no. 5 (1768); All., Fl. Pedem. 1: 315 (1785); E. Mey., Comm. 1: 92 (1836); Eckl. & Zeyh., Enum. 1504 (1836); Harv. in F.C. 2: 163 (1862); Heyn, Annual Sp. *Medicago*: 55 (1963); Schreib F.S.W.A. 60: 86 (1970); J. B. Gillett in F.T.E.A., Leguminosae 4,2: 1037 (1971); Jacot Guill., Fl. Lesotho: 192 (1971). Iconotype: plate 34 in Breyne, Exoticarum aliarumque minus cognitarum plantarum (1678), fide Heyn, l.c.

M. polymorpha L. var. *laciniata* L., Sp. Pl. 781 (1753).

M. aschersoniana Urb. in Verh. bot. Ver. Prov. Brandenb. 15: 77 (1873); Adamson & Salter, Fl. Cape Penins. 494 (1950)

Spreading annual up to 35 cm long, branching from near the base. *Vegetative parts* glabrous or sparsely pilose, especially on the petioles and lower surface of the leaflet-midribs. *Stipules* incised or laciniate, simple hairs on lower side only. *Petiole* up to 2 cm long; rhachis above lateral leaflets up to 5 mm long. *Central leaflets* 4–15 mm long, 2–7 mm wide, narrowly obovate or oblong, base cuneate, apex truncate, retuse and apiculate or tridentate, leaf margins serrate or irregularly laciniate, upper surface glabrous, lower surface sparsely pilose. *Racemes* 1–2 flowered, peduncle with a terminal cusp. *Florets* 4–6 mm long, pedicel shorter than the calyx tube; bract \pm length of the pedicel. *Calyx* 2–4 mm long, sparsely covered with appressed hairs, teeth shorter than the tube. *Corolla* yellow, $>2 \times$ length of the calyx. *Standard* 4, 5–6, 0 mm long, ovate. *Wing petals* shorter than the keel. *Developing pod* glabrous, contracted but protruding sideways from the calyx, coiling anti-clockwise. *Mature fruits*

1(2) per raceme, olive-shaped, globular or cylindrical. *Coils* 5–7, turning clockwise, 3–5 mm in diameter, not strongly appressed, radial veins S-shaped, 8–16, and not anastomosing until they run into a protruding lateral vein, lateral veins adjoining the elevated dorsal suture as shoulders at right angles. *Spines* 8–16 in each row, 2–4 mm long, distinctly grooved in their basal part, inserted at 90° – 180° to the coil face. *Seeds* 2–3 mm wide, 1, 0–1, 5 mm wide, 5–10 per pod, non-partitioned, oval—slightly reniform, pale yellow to yellow-brown; radicle up to $\frac{2}{3}$ seed length, tip clear but rarely curled out, hilum a small hollow. *Cotyledons* 10–16 mm long, 1.5–2.5 mm wide, narrowly cuneate-obovate. $2n = 16$. Fig. 1.

Distribution

The natural habitat of cut-leaf medic is in dry, sandy or stony desertlike conditions. It is native to the southern coast of the Mediterranean Sea extending from the Canary Islands over North Africa to the drier areas of India and Pakistan (Lesins *et al.*, 1980). Elsewhere it is an adventitious weed. In southern Africa it has become naturalized in the drier hinterland and in a few isolated instances along the East Coast or nearby Agricultural Experimental Stations (Fig. 2). Like *Medicago* it is probably far more extensive in the Cape Province than existing herbarium material would indicate.

Common name

Sotho: Bohomenyana, the small 'Bohome'. Phillips (1917) says that this word is derived from ho



FIG. 1.—*Medicago laciniata*. Photo showing habit, leaf, and inflorescence of a plant growing near Port Edward, Natal.

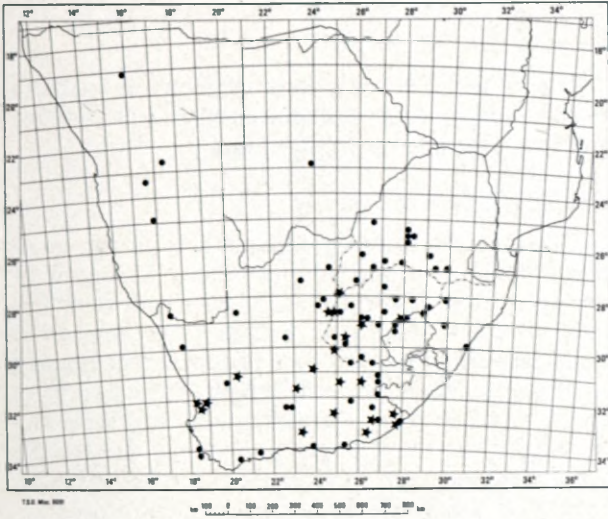


FIG. 2.—Known distribution of *Medicago laciniata* in southern Africa: ●, var. *laciniata*; ★, var. *brachyacantha*.

homa — to adhere or stick to, referring to the spiny fruits which adhere to clothing.

Ethnobotanical uses

According to Phillips (1917) cut-leaf medic is ground up finely and then as an infusion used as a love philtre.

Variation within species

Cut-leaf medic is a rather variable species. Intraspecific delimitation has been based in the past on the degree of laciniation of the leaflets and stipules, length of peduncles, size of pods, number, length, and angle of insertion of spines, and the number of veins on the coil face.

South African material has been commonly known as *M. aschersoniana* Urb., because of the widespread lack of laciniation in much of the South African material. However, experimental hybridizations (Lesins & Erac, 1968; Lilienfeld, 1959) have given successful crosses between *M. laciniata* and *M. aschersoniana*, so one must conclude that they are variants of a single species.

Although 10 varieties have been named in *M. laciniata* (Heyn, 1963) only two are generally recognized (Heyn, 1970, McComb, 1974): 1, var. *laciniata* with stipules and leaflets lacinate, peduncle longer than the petiole, pods with 5–7 coils and long spines; 2, var. *brachyacantha* Boiss. with stipules and leaflets serrate, peduncle equal or shorter than the petiole, pods with 2.5–4.5 coils and variable length of spines. These characters, as indicated in the introduction, break down in southern Africa. No purpose is served, therefore, in giving infraspecific categories for this material until a detailed field study is undertaken in South Africa (see for example Friedman & Orshan, 1974; Friedman & Elberse, 1976).

Distinction between species

Medicago laciniata is readily separable from *M. polymorpha* by its wing petals being shorter than the keel; the sigmoid, slightly branching, non-freely anastomosing radial veins on the pod face, seed

radicle $\frac{2}{3}$ the length of the seed and seeds not partitioned in the pod. More fundamentally *M. laciniata* is $2n = 16$, whereas *M. polymorpha* is $2n = 14$.

Vouchers

Acocks 7092, 7118, 9184, 9623, 16192, 16532, 18698; Anderson 243; Archibald 6147, Badenhorst 11,68; Beeton 108; Bolus 8984; Bryant 1134; Brynard, 110; Burt Davy 9282, 10736, 10782; Clarke 512; Class 6; De Victoria 44; Dieterlen 147; Du Toit PRE 54930; Ecklon & Zeyher SAM 15386, 32123; Flanagan 1891; Fourcade 1567; Galpin 1651B; Gerstner, 92; Gibbs Russell, Robinson, Herman & Downing, 4254; Giess 3976; Giess & Hübsch 11603; Giess, Volk & Bliessner 6107; Gill, 28; Goossens, 651; Grobbelaar 658, 799; Jacot Guillarmod 417; Hafström 827, 1004; Hanekom, 924, 2121; Henrici 162, 2598; Hughes PRE 54968; Jooste 252, 313; Junod 17374; Kinges 1811; Kretschman PRE 15694; Landsdell 1193; Leendertz 3762, 3985, 9443, 10923; Leistner 196, 829, 1507; Marloth, 793; Marsh 128; Merxmüller & Giess 28230; Mogg 11626, 15124, 16586, 16619, 16766, 16854; Moran 93, 1345A, PRE 19592; Müller 1837; Obermeyer 27806; Orpen 23; Patterson 513A; Pohl PRE 57978; Pole Evans 1624, 1741; Pont 379; Potts 2919, 2943, 3119; Ratray 1308; Repton 6925; Roberts 5442; Rogers 27478; Schlechter 1256, 4308, 5135, 10859, 12107; Schmitz 69, 227, 4215; Silk, 57; Smith 517, 1428, 3998, 4402; Stephen Van Graan & Schwabe, 961; Stirton 1056, 6082, 6223; Story 4923; Strey 7863; Sutton 262; Taylor 5263; Theiler 12027; Theron 57; Thompson & Le Roux 26; Thorne SAM 51905, 52517; Van Breda 540; Van der Berg 3922; Van der Merwe 1150; Van Ginkel 233; Van Niekerk 18978; Ward 5967; Wasserfall 1162; Werdermann & Oberdieck 1072AA; Werger 286; West 1127; Whitlock 549; Wilman 19593; Wolff 31; Zeyher 2370.

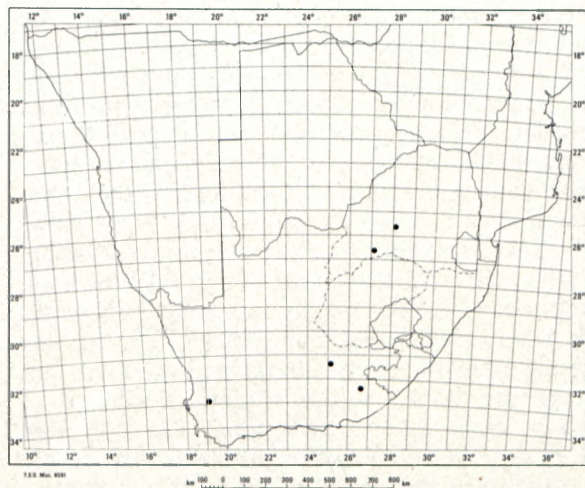
2. *Medicago lupulina* L., Sp. Pl. 2: 779 (1753); Bak. in F.T.A. 2: 51 (1871); J. B. Gillett, in F.T.E.A., Leguminosae 4,2: 1013 (1971). Type: Europe, fide Heyn, in Bull. Res. Council Israel 7D: 162 (1959).

Short-lived perennial or annual herbs, prostrate to ascending, 20–60 cm long, branching from the base. Vegetative parts more or less densely covered with simple appressed hairs. Stipules entire or dentate, green, upper surface mostly glabrous, lower densely hairy, lanceolate. Petiole very short in upper leaves, up to 1.5 cm in lower leaves. Central leaflets from leaflets in rosette 4, 5–6, 0 mm long, 4, 5–7, 0 mm wide, orbicular-cuneate-obovate; leaves on branches 11–15 mm long, 6–11 mm broad, obovate-oval, pubescent on both sides, apex retuse or apiculate, margin slightly toothed in upper half. Racemes 5–25 flowered, exceeding the subtending petioles, elongating in fruit until 3–5 times the length of the petiole, slightly awned. Florets small, 2.5–3.5 mm long, pedicel shorter than the calyx tube, bract filiform. Calyx 1.0–2.0 mm long, pubescent, lateral and carinal teeth slightly longer and the vexillar teeth slightly shorter than the tube. Corolla yellow, about twice the length of the calyx. Standard 2–2.5 mm long, subrotund. Wing petals shorter than the keel. Young fruit contracted within the calyx, hairy. Mature fruit about 2.5 mm long, single-seeded, coiled distally, sparsely pubescent, black when ripe, veins numbering 3–6, curving obliquely from the centre, branching outwards but entering the dorsal suture without a change of direction. Seed 1.5–2.0 mm long, 1.0–1.75 mm wide, oval or round, yellow or yellow-brown; radicle longer than half the length of the seeds, tip distinct. $2n = 16,32$; it is not known whether both cytotypes occur in southern Africa. Fig. 3.

FIG. 3.—*Medicago lupulina* (Bayliss 8452).

Distribution

Black medic is a late-maturing species that has a preference for moister and cooler habitats than is the case for most annual medics. It occurs naturally in Europe, North Africa and most of Asia (Lesins & Lesins, 1980) and is an introduction in other temperate areas. In southern Africa it has been found occupying waste ground, hillsides, and is reported to be a weed of gardens, kikuyu (*Pennisetum clandestinum*) lawns and lucerne (*M. sativa* L.) fields (Fig. 4). It is apparently relished by livestock. In southern Africa it flowers predominantly in October, but extends well into January.

FIG. 4.—Known distribution of *Medicago lupulina* in southern Africa.

Variation within species

Black medic is fairly homogeneous in southern Africa and it is not expected that any striking variants will turn up in the future.

Distinction between species

Black medic is easily separated from the other three medics, naturalized in southern Africa, by its one-seed, non-dehiscent black fruits with their tips twisted into a small coil; and its large number of small flowers subtended by a peduncle that is equal to or greater than twice the length of the petiole of the subtending leaf. These features, together with the slightly toothed upper margins of the leaflets subtended by entire or irregularly toothed stipules, should be conclusive for a correct identification.

Vouchers

Acocks, 15952; Bayliss 8452; Hanekom, 1286; Howlett, 2622; Louw, 1080; Obermeyer, 27842; Repton, 1459; Smith, 1433; Theron, 527; Ubbink, 476. Cultivated: Grobbelaar, 174.

3. *Medicago polymorpha* L., Sp. Pl. 2: 779 (1753), emend Shin. in *Rhodora* 58: 5 (1956); Heyn, Annual Sp. *Medicago*: 71 (1963); J. B. Gillett in F.T.E.A. Leguminosae 4,2: 1039 (1971). Type: Hort. Cliff., No. 118 (BM, lecto.)

M. nigra Krock., Fl. Siles. 2,2: 244 (1790); DC., Prodr. 2: 178 (1825); Eckl. & Zeyh., Enum. 1502 (1836); E. Mey., Comm. 92 (1836). Type: Unknown.

M. hispida Gaertn., De Fruct. 2: 349, t. 155 (1791); Adamson & Salter, Fl. Cape Penins. 494 (1950); M. D. Henderson & J. G. Anders., Common Weeds in S. Afr. 180 (1966). Type: fruit of unknown origin (?P, holo.).

M. denticulata Willd., Sp. Pl. 3: 1414 (1802); DC., Prodr. 2: 176 (1825); Eckl. & Zeyh., Enum. 1503 (1836); E. Mey. Comm. 92 (1836); Harv., in Harv. & Sond., Fl. Cap. 2: 162 (1862). Type: from S. Europe, Herb Willdenow no. 14327/4 (B. holo.).

Annual procumbent herbs with many spreading branches arising at the crown of long tap roots and secondarily along the main branches. *Vegetative parts* glabrous except for a few hairs on the petiolules, lower surface of the leaflet-midribs, calyces and young peduncles. *Stems* up to 60 cm long, green, sharply angled. *Stipules* lacinate, green, ovate up to 10 mm long. *Petiole* up to 3–4 cm long. *Central leaflets* 9–20 mm long, 7–20 mm wide, cuneate to obovate, apex obtuse or retuse, apex apiculate, margin nearly entire or with 5–10 teeth each side of upper third. *Raceme* 1–5 flowered. *Florets* 4–6 mm long; pedicel shorter than the calyx tube; bract longer than the pedicel. *Calyx* about 2,5 mm long; teeth more or less equal to the tube. *Corolla* yellow, 3–5 mm long. *Standard* broadly obovate, emarginate. *Wing petals* longer than the keel. *Developing fruit* initially contracted and protruding sideways from the calyx, coiling anti-clockwise. *Mature fruits* 1–5 per raceme, discoid, short to long-cylindrical, or conical truncate, spiny tuberculate or spineless, mostly glabrous. *Coils* 1,5–7,0 not tightly appressed, 3,5–8,0 mm in diameter, turning clockwise; radial veins curved 6–15, anastomosing freely before entering the lateral vein, between it and the dorsal suture there is a prominent groove traversed by roots of spines and



FIG. 5.—*Medicago polymorpha* var. *polymorpha* (Stirton 6192A)

tubercles. *Spines*, if present, up to 16 in each row, 0,5–4,0 mm long, grooved, inserted at 90° (on end coils) to 180° to the face of the coil, some hooked. *Seeds* 2,5–4,0 mm long, 1,5–2,0 mm wide, 4–8 per fruit, partitioned, oval to subreniform, yellow to yellow-brown; radicle equal to or less than half the length of the cotyledons, 2n = 14. Fig. 5.

Distribution

Burr medic is distributed through much of South Africa. This Mediterranean species has established itself in many parts of the world, where it has become a weed of cultivation and pastures. It is a nuisance in sheep farming areas as the burrs cling to wool thereby resulting in cheaper wool prices. In southern Africa it has been found along roadsides, in lawns and vegetable gardens, irrigation areas and in clover/kikuyu pastures (Fig. 6). Flowering occurs from August to December with a peak in September.

Common names

Klawergras (Afrikaans).

Variation within species

Like *M. laciniata*, burr medic is a rather variable species. [See Lesins & Lesins (1980) for a fuller discussion.] Intraspecific variants are usually distinguished on fruit characters. The three most common varieties are those accepted by Heyn (1963):

- Pods spineless or tubercled (Fig. 9c) var. *brevispina* Heyn
- Pods with spines:
 - Diameter of coils 5–8 (10) mm, number of coils 4–6, spines thick and hardened, 1–5-flowered (Fig. 9a) var. *polymorpha*
 - Diameter of coils 2,5–4,5 mm, number of coils 1,5–3,5, spines thin and slender, 5–10-flowered (Fig. 9b) var. *vulgaris* Shin.

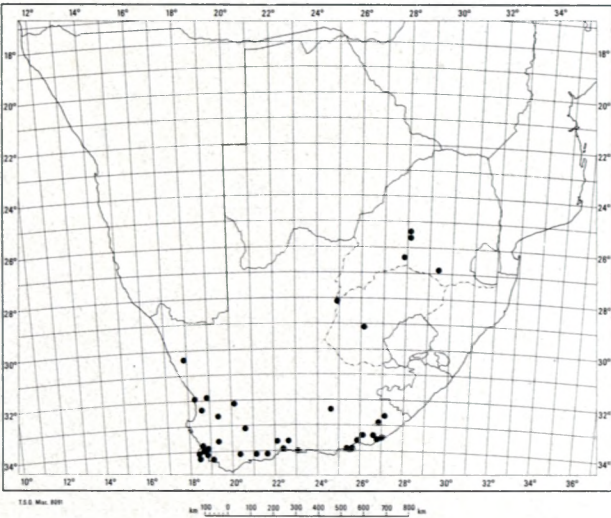


FIG. 6.—Known distribution of *Medicago polymorpha* in southern Africa.

Although there are plants in southern Africa which fit these categories there are others which do not; a similar finding to that of McComb (1974), who studied the naturalized medics in Western Australia.



FIG. 7.—*Medicago polymorpha* var. *brevispina* (PRE 54913)

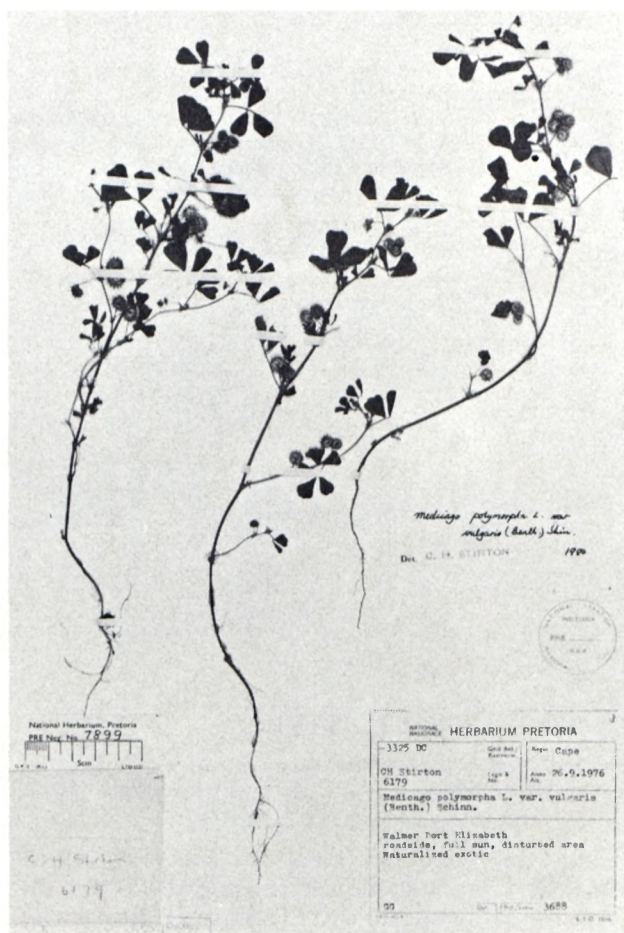


FIG. 8.—*Medicago polymorpha* var. *vulgaris* (Stirton 6179)

As *M. polymorpha* is easily distinguishable from the other three medics in southern Africa, I will let the matter rest until an intensive experimental study is carried out on the infraspecific variation which occurs here.

Variation between species

The spiny forms of burr medic are often confused with cut-leaf medic, *M. laciniata*. A comparison of fruits easily distinguishes them, however. In burr medic there are thin partitions between the seeds, whereas in cut-leaf medic there are no partitions. Furthermore, the radial veins on the pod face are curved, never sigmoid, and anastomose freely. Another character that separates the two species is that in burr medic the wing petals are longer than the keel, whereas in cut-leaf medic the wing petals are shorter than the keel.

Vouchers

Acocks 9122; Baker PRE 54912, 54913; Bloxam PRE 10781, Bolus 79; Brink 184; Britten 12314; Dahlstrand 2350; *M. Drège* 3075, Ecklon & Zeyher 1502, 1503, 2370; Foley 95; Gibbs Russell 3401; Gitten 133; Glass 517; Gordon PRE 4624; Grobbelaar 274, 1388; Hanekom 2136; Harvey 7501; Jenkins 9946; Jordan s.n.; Lansdell 851; Leendertz 8363; Marais 439; Marloth 7198, 9428, 10831; Mogg 16855; Muir 1594, 2376; Phillips PRE 54998; Potts 2920; Purcell, 288; Rogers 16652, 27371; Scott PRE 54916; Sim 19440a; Stirton 5909, 5973, 5983, 6067, 6121, 6165, 6179, 6183, 6185A, 6192A, 6195A, 6226, 6377; Story 2779, Taylor 5275, 9888; Van Dam PRE 18850; C. van der Merwe 1300; Wilman PRE 54915, 54935.

4. *Medicago sativa* L., Sp. Pl. 2: 778 (1753); Eckl. & Zeyh., Enum, 1501 (1836); E. Mey, Comm. 91 (1836); Harv., in Harv. & Sond., Fl. Cap. 2: 162 (1862); Adamson & Salter, Fl. Cape Penins. 494 (1950); Jacot Guill., Fl. Lesotho 82 (1971). For detailed discussions on synonymy see Iverson & Meijer (1967), Lesins & Lesins (1980), and Gunn, Skrdla & Spencer (1978).

Perennial herbs with 1 to many procumbent or ascending to erect stems up to 80 cm long arising from a stout crown and rootstock. Vegetative parts variously covered with simple appressed hairs. Stipules entire or basally toothed. Leaflets 10–25 mm long, 3–15 mm wide, obovate below becoming linear-oblancheolate higher up, serrate towards the apex, midrib ending in a terminal tooth. Racemes 10–35-flowered, elongate peduncle greatly exceeding the corresponding petiole, terminally awned. Florets 6–12 mm long, pedicel more or less equal to or longer than the calyx tube and the bract respectively. Calyx half the length of the floret, tube more or less equal to the teeth. Corolla purple, mauve or pale lilac. Standard oblong. Wing petals longer than the keel. Young fruit rises from the calyx, then bends sideways. Mature fruits 2.5–9.0 mm in diameter, spineless, coiled in a spiral, glabrous or with simple appressed hairs; coils 1–5, turning clockwise; many, starting from the ventral suture running obliquely, somewhat branching, then anastomosing in the outer part of the coil face. Seeds



FIG. 9.—Fruits types in *Medicago polymorpha*: a, var. *polymorpha*; b, var. *vulgaris*; c, var. *brevispina*.

2–12, 1.0–2.5 mm long, 1.0–1.5 mm wide, yellow to brown; radicle just over half the length of the seed. $2n = 16,32$. Fig. 10.

Distribution

M. sativa, lucerne or alfalfa, has escaped from cultivation in most areas where it has been cultivated in southern Africa (Fig. 10) It is particularly common along roadsides in some regions. Flowering occurs from October to February, but mainly during October and November.

Jacot Guillarmod (1971) reports the occurrence of the rust *Uromyces striatus* Schroet. on plants cultivated at Mamathes in Lesotho.

Variation within species

Although some authors advocate nine subspecies in an expanded species description (Gunn, Skrdla & Spencer, 1978), others accept two subspecies in a narrower species description (Davis, 1970; Lesins & Lesins, 1980). The fragmentation of the *M. sativa* L. complex by Vassilczenko (1949), Sinskaya (1950) and others has been discussed by Lubenetz (1972), Lesins *et al.* (1980), and Iverson & Meijer (1967).

The two main subspecies recognized by most authors may be keyed out as follows:

- Fruits 2–4 (5) mm in diameter, usually smaller than calyx;
seeds 1.6–2.0 mm long; florets 5–6 mm long
..... subsp. *coerulea* Schmalh.
Fruits 5–9 mm in diameter, concealing calyx; seeds
2.2–2.5 mm long; florets 6–12 mm long.....subsp. *sativa*



FIG. 10.—*Medicago sativa* (Reid 143)

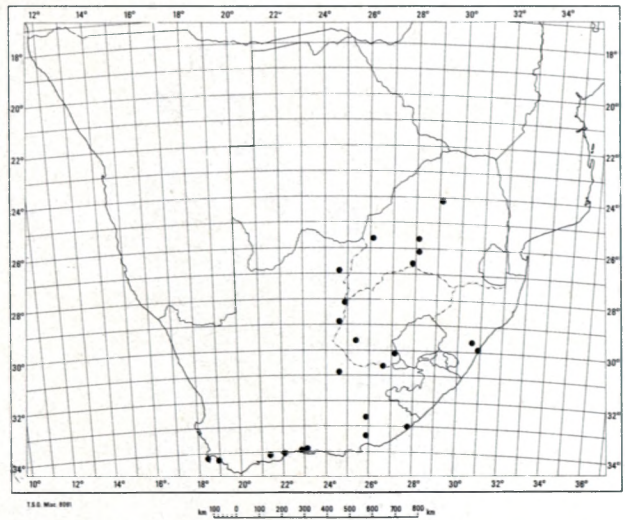


FIG. 11.—Known distribution of *Medicago sativa* in southern Africa.

Variation between species

M. sativa is easily recognized among naturalized medics by its purple, mauve or pale lilac flowers and its smooth, 2–12-seeded legumes.

Vouchers

Adams 108; Alexander PRE 54979; Burt Davy 12610; Ecklon & Zeyher 1501; Gerstner 148; Grobbelaar 269, 438, 1231, 1304; Johnson 791; Leendertz 7378, 8364, 10914, 11132; McClean 800; Moran s.n.; Muir 1297; Rattray, 1278; Reid 143; Scott PRE 54983; Stirton 6171, 6331; Theiler PRE 54975; Vahrmeijer 2233; Verdoorn 953; Victoria 48; Walker Moss Herb. 26829; Walters PRE 8115; Wells 1445.

Cultivated medics

The following species have been cultivated in southern Africa at some time or other in the past. None have yet been collected from the wild as persistent escapes.

1. *M. arabica* (L.) Huds., Fl. Angl. 288 (1762). *M. polymorpha* L. var. *arabica* L., Sp. Pl. 780 (1753).

Spotted burr medic is characterized by the purplish brown blotch (sometimes absent) on each leaflet and the coiled burr-like pod. It is similar to burr medic, *M. polymorpha*, but differs from that species in its multicellular hairs, distinctly toothed stipule margins and dorsal suture in a groove. A coil viewed from the edge has 3 grooves and 4 ridges. The radicle is longer than half the length of the cotyledons.

Voucher

Grobbelaar 1975.

2. *M. arborea* L., Sp. Pl. 778 (1753).

Tree medic is a 1–4 m high perennial shrub densely covered in appressed silky hairs. It bears large yellow to golden flowers, has entire, triangular stipules and large spirally coiled smooth pods.

Vouchers

Codd 2484; Grobbelaar 1377; Melle (20/09/1919), Theron 44.

FIG. 12.—*Medicago falcata* (Maree 38)

3. *M. falcata* L., Sp. Pl. 779 (1753). *M. sativa* L. var. *falcata* (L.) Döll, Rhein Fl. 802 (1853); *M. sativa* L. subsp. *falcata* (L.) Arcangeli, Comp. Fl. Ital. 160 (1882).

Sickle medic is a bright yellow-flowered perennial herb with straight to sickle shaped pods. Similar in habit to lucerne (Fig. 12).

Vouchers

Grobbelaar 1068; Prinshof Station 1608; Theron 72.

4. *M. × hemicycla* Grossh. (*M. sativa* × *M. falcata*). *M. hemicycla* Grossh. in Zap. lauchno-prikl. Otd. tiflis Sada 4: 147 (1925). *M. sativa* L. subsp. × *hemicycla* (Grossh.) Gunn, U.S.D.A. Tech. Bull. 1574: 15 (1978).

A fertile hybrid with variegated or purple-tinged flowers and curved to C-shaped pods. Fig. 13.

Voucher

Moorwood 25642.

5. *M. intertexta* (L.) Mill., Gard. Dict. edn 8, no. 4 (1768). *M. polymorpha* L. var. *intertexta* L., Sp. Pl. 780 (1753).

Yellow to orange-flowered annuals forming spherical to ovoid, 8–9, loosely appressed, glabrous burrs with interlocking appressed spines. Seeds black. A purple basal shield-shaped mark may be present. Hedgehog medic.

Voucher

Grobbelaar 974 (immature specimen, so some doubt about this identification).

6. *M. orbicularis* (L.) Bart., Cat. Plante Siena: 60 (1776). *M. polymorpha* var. *orbicularis* L., Sp. Pl. 779 (1753).

Button medic is an omni-Mediterranean annual species apparently adventitious in central Europe but unsuccessful elsewhere. It has very characteristic smooth pods, which resemble a pile of stacked circular cushions. Seeds are minutely tuberculate. The radicle is almost as long as the cotyledons.

Voucher

Grobbelaar 1364.

7. *M. scutellata* (L.) Mill., Gard. Dict. edn 8, no. 2 (1768).

Snail medic is a hairy annual with large irregularly toothed stipules, 1–3 flowers and large unarmed spirally coiled snail-like pods.

Voucher

Grobbelaar 971.

8. *M. turbinata* (L.) All., Fl. Pedem. 1: 315 (1785). *M. polymorpha* L. var. *turbinata* L., Sp. Pl. 780 (1753).

FIG. 13—*Medicago × hemicycla* Grossh. (Moorewood s.n.)

The following specimens do not bear fruits and so are included here with a measure of doubt.

Vouchers

Grobbelaar 160, 169, 973.

Further information on these cultivated species may be found in Healy (1976), Gunn *et al.* (1978), McComb (1974) and Lesins *et al.* (1980).

UITTREKSEL

Vier species van *Medicago*: *M. laciniata*, *M. polymorpha*, *M. sativa* en *M. lupulina* het in Suidelike Afrika genaturaliseerd geraak. Hulle morfologiese variasie en geografiese verspreiding word bespreek en 'n sleutel word voorsien.

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