

## **Birdseed aliens originating from Niger (*Guizotia abyssinica*) wild bird food**

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This pdf constitutes the Version of Record published on 14<sup>th</sup> December 2019

### **Abstract**

Although batches of Niger (*Guizotia abyssinica*) seed imported for wild bird food from North Africa, and more recently India, achieve a very high degree of purity, impurities occur and include some taxa potentially capable of growing to maturity in Britain and Ireland. Many such plants are important arable weeds in regions where *G. abyssinica* is grown on a large scale for human consumption. This paper lists species that have been cultivated over the last ten years from commercially available Niger seed, and the years of their occurrence.

### **Keywords**

Ethiopia, India, oilseed, arable weed, goldfinch, *Cuscuta campestris*.

### **Introduction**

In earlier studies of birdseed aliens in Britain (Hanson & Mason, 1985; Hanson, 2000) it became clear that amongst the expected impurities which characterised seed imported from the USA, Europe and Argentina, there was also an element of the North African weed and crop flora. This is because Ethiopia exported large quantities of Niger (*Guizotia abyssinica* (L. f.) Cass.) which is now bought even more widely in Great Britain as wild bird seed in order to attract garden birds, particularly goldfinches and siskins, via the many bird-feeders now commercially available. These particular birds do not usually eat at ground level.

Until 1948 the commodity was generally called "thistle seed" or "Niger" but the American Wild Bird Feeding Institute then changed the name to "Nyjer" in order to avoid any possible racial connotation. (Quinn & Myers, 1998). Today, Niger seed is produced mainly as an oilseed crop in Ethiopia, India, Bangladesh, Myanmar, and Nepal. In Ethiopia it is the principal source of edible oil while in India 75% is used for this purpose whilst 25% is exported mainly to the USA as bird food. Smaller amounts are also grown and exported from Singapore, Pakistan and Indonesia. (EPPO, 2007).

### **Impurities in Niger seed**

Sorting through 1kg packets of Niger seed with a hand lens and tweezers to separate out the impurities is a laborious task but is necessary because the product is normally well over 99% pure, and sowing drills of the entire birdseed is unproductive.

Because of the subtropical origins of Niger seed, most of the impurities mature rather late in the year here in Britain and the non-annuals being frost-tender succumb to autumn temperatures. Under glass some of the latter grasses mature in the following January or February and other plants in the subsequent summer. For this reason several species that I have carefully nurtured have never (as yet) been recorded in the wild as a component of our vast and ever increasing alien flora.

In the USA, Niger is the only imported wild bird food and latest figures indicate that over 40,000 tons are imported in a single year (around 10,000 tons in Britain). All this seed is heat-treated, not to kill the *Guizotia* seeds (which the birds would probably not then favour) but to destroy the viability of the contaminant *Cuscuta campestris* Yunck. (Yellow Dodder) which is a proscribed noxious weed in the USA. In Britain neither of these two species will survive the winter or normally even set seed so the heat treatment is not necessary. Hardier strains of *Guizotia* are being developed in America which could be grown to maturity there and might make importation and heat-treatment unnecessary (Tamodo & Millbury, 2002).

One of the most intriguing autumnal sights regularly reported under British bird-tables is *Cuscuta campestris* scrambling up the two-metre tall stems of *Guizotia abyssinica*, neither plant being generally recognised by the inexperienced observer. Other associated plants frequently noted are *Datura stramonium* L. (Thorn-apple) (often described in local newspapers as "the plant from Mars") and various "strange grasses" (listed later).

Relatively large quantities of Niger seed from Delhi and Kolkata are now reaching our shores so we should not be surprised to find the occasional Indian weed present among the North African ones. Ethiopian exporters quote 98.5% purity but I find the figure nearer to 99.8% so it would appear that further cleaning is carried out before the Niger is finally bagged up and sold. I have attempted to purchase the less pure Indian seed at source but was told that the minimum order would be 16 tonnes. A similar approach to Ethiopian producers resulted in no response whatever.

Being so high in edible oil, fats and protein, *Guizotia* seed is one of Ethiopia's staple foods. It provides half of that Country's edible oil and is also used in the production of soaps and paints. We must not imagine that Indian and Ethiopian farmers are simply thinking about the welfare of siskins and goldfinches! *G. abyssinica* was first described scientifically as *Polymnia abyssinica* by Carl von Linné the younger (1741-1783) in 1782. It was transferred into the new genus of *Guizotia* by A.H.G. de Cassini in 1829. The first recorded wild-growing plant in Britain was in 1861. Current studies show that it has been sighted in about 140 hectads; very few records exist north of a line between Lancaster and York while in cooler summers it might not flower even in the south until October. It used to be a regular feature on municipal refuse tips and water treatment works. Almost every year since 2012 some *Guizotia* plants raised at Ware have turned out to be *G. scabra* (Vis.) Chiov subsp. *schimper* (Sch. Bip.) J. Baagøe – something of a misnomer as these plants are softly hairy and viscous – not scabrid at all! In Africa there are at least fifteen *Guizotia* species, so it is possible that the current identification of British specimens of *Guizotia* is not always 100% accurate. This is reminiscent of the current confusion over the genera *Amsinckia* and *Amaranthus*.

Since the previous birdseed papers of Hanson & Mason (1985) and Hanson (2000) very few new cultivated additions other than those from Niger seed have

appeared; viz. *Rumex obtusifolius* L. and *Vicia benghalensis* L. On the other hand the resumed annual studies of Niger seed aliens since 2009 have produced on average eight additional species each year and the current total stands at around 90 with a few more still indeterminate from previous years in the study.

Tamodo & Milburg (2000) list 102 arable weed species from Eastern Ethiopia in order of frequency. Around half of the 25 most common species listed have been recorded in Britain from imported Niger seed and more must surely follow even though most seeds of a different size or shape to those of *Guizotia* are systematically removed at source.

### List of taxa recorded

A few of the following taxa may need later updating of names or later re-determination. Voucher specimens are deposited in Herb. C.G. Hanson or Herb. E.J. Clement and some of the grasses in **K**. I have refrained from inventing new English names where none could be found. Nomenclature follows Stace (2019) but names not in Stace follow the International Plant Names Index (IPNI). Years in which taxa were recorded are shown in parentheses. Some of the species that will be less familiar to British and Irish botanists are illustrated in Figures 1-20 at the end of the paper.

### FABACEAE

*Lupinus albus* L. (White Lupin). Traditionally grown as a pulse crop in Europe and since antiquity in Ethiopia. The seeds are much larger than those of Niger so are generally removed at source. This was recorded and grown from Niger seed in 1994 but not since. [ – ]

*Trifolium spananthum* Thulin. (Fig. 1) Perhaps one of the most exciting Niger seed plants. An Ethiopian endemic only described in 1976. Only one specimen ever raised. No British records. [2010]

*Ervilia hirsuta* (L.) Opiz (Hairy Tare). A native of Europe and western Asia. In Ethiopia the seeds are collected from the wild and then roasted for food while the leaves and shoots are used as a vegetable. Earlier Niger records from 1994 and 1995 only. [2012]

*Vicia lens* (L.) Cass. & Germ. subsp. *ervoides* (Brign.) H. Schaef., Coulot & Rabaute. A wild relative of the Lentil, a widespread weed including in Ethiopia with no recent British records. [2009, 2012, 2013, 2018]

### EUPHORBIACEAE

*Euphorbia heterophylla* L. (Desert Poinsettia). Originating from Mexico, it is now an agricultural weed in both India and Ethiopia, not recorded in the wild in Britain. [2011, 2017, 2018]

### LINACEAE

*Linum usitatissimum* L. (Flax, Linseed). Native of Europe, grown in Ethiopia for oil, for which use it is second there only to *Guizotia*. At the end of Lent, Ethiopians make

a laxative drink from this to prepare for the “the big meat meal” on Easter Day. [2009-2018]

### **ONAGRACEAE**

*Oenothera stricta* Ledeb. ex Link (Fragrant Evening-primrose). This American genus is naturalised in both Ethiopia and India. Identification for this is not yet absolutely certain. [2015]

### **RESEDACEAE**

*Caylusea abyssinica* Fisch. & C.A. Mey. (Fig. 2) Native of East Africa where it is used as a vegetable. A pernicious weed in Ethiopia which can infest fields of Teff (q.v.) and affect the taste of its products. [Very few British records from the wild appear to exist although it has come up as a Niger impurity every year between 2009 and 2018.]

### **CLEOMACEAE**

*Cleome* cf. *rutidosperma* DC. (Spider Plant). Pantropical weed throughout most of Africa. The leaves can be cooked and eaten. There are about 50 *Cleome* species in Africa although this one is apparently absent from Ethiopia. [2012]

### **BRASSICACEAE**

*Brassica carinata* A. Braun (Ethiopian Rape). (Fig. 3) As its common name suggests, a native of Ethiopia and grown as an oil-seed crop there. The biofuel oil is used in jet engines. [Every year 2012-2018]

*Brassica juncea* (L.) Czern. (Chinese or Indian Mustard). Long used in Africa as “greens”; cultivars are the source of mustard oil and table mustard. [2009, 2012, 2013, 2017]

*Brassica rapa* L. (Indian Rape, Turnip). Found worldwide in various cultivars. A weed in Ethiopia. This is not the well-known oil-seed rape which is *B. napus*, the latter not yet recorded from Niger impurities. [2010, 2011, 2013]

*Erucastrum abyssinicum* O.E. Schulz. This is an Ethiopian endemic with no known British records. [2009, 2010, 2017, 2018]

*Raphanus sativus* L. (Radish). Probably originating in south-east Asia, this vegetable is now grown world-wide and frequently imported from north Africa. Very common in commercial birdseed but strangely rare as a Niger contaminant perhaps because of the seed size. [2017, 2018]

### **POLYGONACEAE**

*Persicaria nepalensis* (Meisn.) H. Gross (Nepal Persicaria). This species is a serious weed in Ethiopia; it thrives at high altitude in the tropics and becomes invasive there. [2011, 2012, 2015]

*Persicaria setosula* (A. Rich.) K.L. Wilson. Occurs widely in central and eastern Africa including Ethiopia. Poor material allows only a provisional determination. [2013]

## **AMARANTHACEAE**

*Achyranthes aspera* L. var. *indica* L. (Chaff-flower). Originating in S.W. Asia, is now in both Ethiopia and Pakistan where it is used medicinally. One of the few perennial Niger seed aliens. [2014, 2015]

*Amaranthus blitum* L. (Guernsey Pigweed). (Fig. 4) Originally from the Mediterranean region but now widely naturalised in Ethiopia and grown there as a pot-herb. [2017, 2018]

*Amaranthus cruentus* L. (Purple Amaranth). Originally from Central and South America. Grown commercially in Ethiopia from whence much is exported as grain. [2013, 2015]

*Amaranthus graecizans* L. (Short-tepalled Pigweed). (Fig. 5) Native to Africa, southern Europe, East Asia and India. A bad weed in Ethiopia where it is used as a vegetable and often cooked in buttermilk. [2014]

*Amaranthus hybridus* L., including var. *chlorostachys* Thell. (Green Amaranth). Originally from the USA. Grown in Ethiopia as a crop for its seeds. [Every year 2012-2018]

*Amaranthus quitensis* Kunth (Mucronate Amaranth). Native to Ecuador, grown in Ethiopia for its seeds. Never sets seed in Britain. [2018]

*Amaranthus retroflexus* L. (Common Pigweed). Native of western USA, grown as a crop for its seeds in Ethiopia. Although recorded in Hanson & Mason (1985), strangely absent so far in the present Niger survey despite being common in ordinary bird seed mixes. [ – ]

*Amaranthus spinosus* L. (Spiny Amaranth). (Fig. 6) Native of tropical America, grown commercially in both India and Ethiopia where it has a host of medical applications. [2012, 2014]

*Amaranthus viridis* L. (Green Pigweed). From tropical America. Regularly eaten in India and Africa where the seeds are used in biscuits or as a porridge. [2018]

*Celosia trigyna* L. (Woolflower). An African weed grown in Ethiopia for its medicinal applications. [2013, 2018]

*Chenopodium album* L. (Fat-hen). Native range probably Europe but now world-wide including Ethiopia where oil from its seeds is useful against internal parasites. [2017, 2018]

*Chenopodium opulifolium* Schrad. ex W.D.J. Koch & Ziz (Grey Goosefoot). Native of southern and eastern Europe, temperate Africa and Asia. Naturalised elsewhere.

Occurs in Ethiopia where it is listed in the top twenty commonest arable weeds. The leaves are cooked there and eaten with other vegetables. [2018]

### **RUBIACEAE**

*Richardia scabra* L. (Mexican Clover). Native to warmer areas in America, now widely naturalised including India and Ethiopia. A small number of plants appear regularly from Niger. [2014-2018]

### **CONVOLVULACEAE**

*Cuscuta campestris* Yunck. (Yellow Dodder). Originally from the USA, this plant is a serious problem on Niger crops in Ethiopia. This duo combination is becoming a common sight near British bird-tables. [Every year 2009-2018]

### **SOLANACEAE**

*Nicandra physalodes* (L.) Gaertn. (Apple-of-Peru, Shoo-fly plant). (Fig. 7) Originally from Peru, this monotypic genus is now a world-wide weed as well as becoming a common ornamental plant. A common weed in Ethiopia and a frequent Niger seed contaminant. [Virtually every year 2009-2018]

*Physalis angulata* L. (Cut-leaved Ground-cherry)]. (Fig. 8) A widespread tropical weed occurring in both India and Ethiopia. [2012]

### **PLANTAGINACEAE**

*Plantago lanceolata* L. (Ribwort Plantain). Originally from Europe and Asia, now introduced and widespread in America and Australia. In Ethiopia it is used as a local medicine for purposes too numerous to mention. [Every year 2009-2018]

### **LAMIACEAE**

*Salvia tiliifolia* Vahl (Lindenleaf Sage). Native to central America but has now spread throughout America, China and Africa including Ethiopia. The solitary specimen grown from Niger failed to mature completely before the autumn frosts so definite identification requires confirmation. [2017]

### **PEDALIACEAE**

*Sesamum indicum* L. (Sesame). Grown in both India and Africa for various uses. In Ethiopia, 50,000 tons of sesame seed are harvested annually. The characteristically shaped seeds are easily observed in Niger birdseed but successful germination is rare. [2013, 2014, 2017, 2018] [Most on-line sources give *S. indicum* as the accepted name and *S. orientale* L. as a synonym].

### **ASTERACEAE**

*Ageratum* cf. *conyzoides* L. (Goatweed). A native of tropical America, this plant occurs in Ethiopia where it can be a serious agricultural weed. It is used there for medical purposes including wound dressing. [2013]

*Ambrosia artemisiifolia* L. (Ragweed). Native in the USA, a troublesome weed in Ethiopia. [2009, 2011]

*Bidens biternata* (Lour.) Merr. & Sherff (Yellow-flowered Black-jack). Widely distributed in tropical and subtropical Africa. A weed in both India and Ethiopia. In earlier studies 1973 and 1976. [2011]

*Bidens pilosa* L. (Black-jack). (Fig. 9) Originally from South America but now a noxious weed in Africa where it has many medicinal uses. A very striking alien, by far the commonest of this trio of *Bidens* species. [2011, 2014, 2016, 2018]

*Bidens schimperi* Sch. Bip. ex Walp. Native in East Tropical Africa occurring as a weed in Ethiopia. The edible leaves are sometimes gathered and the plant has medicinal uses including the relief of chest pains. [2009, 2011, 2013]

*Crassocephalum crepidioides* S. Moore (Redflower-ragleaf). An invasive annual of tropical and subtropical Africa, native in Ethiopia where it is used as a leafy vegetable and for a range of medical conditions. [2015, 2018]

*Crassocephalum rubens* (Jacq.) S. Moore. (Fig.10) Similar to the above but capitula are smaller and narrower. The flowers are powder-blue! [2017, 2018]

*Erechtites valerianifolius* (Link ex Spreng.) DC. (Tropical Burnweed). Native of Brazil and apparently not yet recorded from the African continent. The similar *E. hieracifolius* (L.) Raf. ex DC. has, however, recently arrived in Ethiopia. [2013]

*Guizotia abyssinica* (L. f.) Cass. (Niger). Originally from east Africa but now a widespread casual in warmer climates. It rarely reaches maturity in Britain but the late flowering plant never ceases to astonish gardeners. [Every year]

*Guizotia scabra* Chiov. subsp. *schimperi* (Sch. Bip.) J. Baagøe. (Fig. 11) An Ethiopian native but now spreading through tropical Africa in dryer areas. Only recently recorded in Britain but almost certainly overlooked earlier as non-flowering plants. [Every year 2011-2018]

*Parthenium hysterophorus* L. (Santa Maria Feverfew). (Fig. 12) Native to the American tropics this has recently become the second most common weed in Ethiopia (the first being *Guizotia*). Surprisingly rare in the current study when it produced a single huge plant in cultivation before being cut down by frosts. [2014]

*Tagetes minuta* L. (Southern Marigold). (Fig. 13) A native of South America but now naturalised over most of the world. In Ethiopia it is one of the six most common weeds but the shape of its seeds makes exclusion of it from most Niger packets easy. [2013]

## **COMMELINACEAE**

*Aneilema aequinoctiale* (P. Beauv.) Loudon (Clinging Aneilema). Native in tropical and southern Africa. In Ethiopia it is a weed in mainly moist areas. Has yellow flowers. [2016]

*Commelina latifolia* Hochst. ex A. Rich. A native of the east African tropics, this perennial is a common weed in Ethiopia which is sometimes used as a pot-herb. [2013, 2016, 2018]

## **POACEAE**

*Arthraxon hispidus* (Thunb.) Makino (Joint Grass). Native in Japan and Australia; but occurs as a weed in Ethiopia. A common impurity in Niger but rather difficult to grow in Britain generally not maturing under glass until the following March. *The Plant List* indicates no less than 130 synonyms for this grass. [Every year 2009-2018]

*Avena abyssinica* Hochst. ex A. Rich. (Ethiopian Oat). A native of Ethiopia where the grain has been used for centuries. Thrives at high altitudes where, mixed with Barley, it is used to make bread and beer. [2016, 2017]

*Avena sativa* L. (Common Oat). Originally from western Mediterranean but now cultivated world-wide. Grown in Ethiopia as a well-known crop. Most seeds are easily removed at source from Niger bird-seed. [2018]

*Avena vaviloviana* (Malz.) Mordv. Native of northeast Africa, long grown in Ethiopia where it retains viability for several years. [2012, 2016]

*Brachiaria deflexa* (Schumach.) C.E. Hubb. ex Robyns (Guinea Millet). Native of northwest Guinea where it has been long grown as a cereal crop. Naturalised in Ethiopia. [2013, 2014, 2015]

*Bromus pectinatus* Thunb. (African Brome). Widespread in Africa, S.W. Asia, India. A major grass weed in Ethiopia which infests arable fields there. [2011, 2018]

*Chloris pycnothrix* Trin. (Spiderweb Chloris). Widespread in tropical regions including Ethiopia where it is an arable weed. [2018]

*Chloris virgata* Sw. (Feather Finger-grass). (Fig. 14) A native in warmer parts of the world including Ethiopia where it is another arable weed. [2013]

*Dactyloctenium aegyptium* (L.) Willd. (Egyptian Crowfoot-grass). (Fig. 15) A weed from tropical Africa and Asia. In Ethiopian flora too. Grown earlier (1982) from Niger seed but only once and not seen since. [ – ]

*Digitaria abyssinica* (Hochst. ex A. Rich.) Stapf (East African Couch-grass). (Fig. 16) The commonest agricultural weed in Ethiopia, infestation can reach over 25,000 seeds per square metre. [2013, 2016, 2017]

*Digitaria ciliaris* (Retz.) Koeler (Tropical Finger-grass). Now found all over tropical regions; an aggressive weed in Ethiopia now infesting my own garden! [2014-2018]

*Digitaria sanguinalis* (L.) Scop. (Hairy Finger-grass). Native of Asia but now a common weed almost worldwide in warm and temperate regions including Ethiopia. [2017, 2018]

*Digitaria ternata* (A. Rich.) Stapf (Crabgrass). A serious weed in most tropical regions including Ethiopia. Grown earlier from Niger seed impurities in 1976. [ – ]

*Digitaria velutina* P. Beauv. (Violet Finger-grass). Another invasive weed in Ethiopia. [1999, 2011, 2016]

*Echinochloa colona* (L.) Link (Jungle Rice or Shama Millett). Originating in tropical Asia and now an invasive weed in Africa, the Americas and Australia. [1983]

*Echinochloa crus-galli* (L.) P. Beauv. (Barnyardgrass or Cockspur). Originally from tropical Asia and Africa, this grass is now an invasive species in North America. It is a 'rice mimic' and is widely distributed in Ethiopia; it can persist for a few years in Britain. [2018]

*Eleusine coracana* Gaertn. (Finger Millet). From temperate Asia and Africa, this grass is widely grown in the highlands of Ethiopia as a cereal crop. [2010, 2015]

*Eleusine indica* (L.) Gaertn. subsp. *africana* (Ken.-O'Byrne) S.M. Phillips (African Yard-grass). (Fig. 17) Native of upland regions in east and southern Africa including Ethiopia where its uses include animal feed. [Almost every year 2009-2018]

*Eragrostis tef* (Zucc.) Trotter (Teff). A native of Eritrea and Ethiopia where it is used as a staple cereal and grown at altitudes between 1800 and 2100m. The grain is almost gluten-free and can be purchased in Britain. [Almost every year 2012-2018]

*Eragrostis virescens* J. Presl (Mexican Love-grass). (Fig. 18) Originates from South America but spread to Europe by 1927. Now occurring throughout Ethiopia and neighbouring Eritrea. [2009, 2011-2014]

*Hyparrhenia anthistirioides* Andersson (Thatching Grass). A native of dryer parts of Africa including Ethiopia. From Niger seed earlier, 1978 and 1985 when it was det. by C.E. Hubbard. [ – ]

*Lolium temulentum* L. (Darnel), including var. *arvense* (With.) Lilj. Native of Europe but infesting wheat fields in southern Ethiopia. This grass was probably the 'tares' mentioned in Matthew's biblical parable. [2011, 2017, 2018]

*Oloptum miliaceum* (L.) Röser & Hamasha (Smilo-grass). A perennial mainly from the Mediterranean region to Iraq and northern Africa but seems not to be recorded yet in Ethiopia. [2007, 2016]

*Oryza sativa* L. (Rice). The seeds of this grass are very characteristic and easily picked out from the Niger packet. Germination is, however, rare and a completely mature specimen has yet to be produced, hence no wild British records exist. [2007, 2015, 2016, 2018]

*Panicum dichotomiflorum* Michx. (Autumn Millet). Native of USA, grown in Ethiopia and fermented there for a beverage. Grown earlier in 1998 from Niger but not since. [ – ]

*Panicum miliaceum* L. (Common Millet). A ubiquitous cereal of unknown origin which is widely grown as its water requirements are the lowest of any cereal. Much grown in the USA, mainly for the birdseed industry. It is farmed in Ethiopia where it can be fermented and made into 'tella', a local beer. Very common in general birdseed mixtures but rather rare in Niger. Recorded only earlier in 1994. [ – ]

*Panicum subalbidum* Kunth (Elbow Buffalo Grass). Widespread throughout Africa including Ethiopia. It generally grows near water and is used as grain or for cattle fodder. Recorded only in 1995. [ – ]

*Paspalum scrobiculatum* L. (Kodo Millet). A grass originating in west Africa that has spread world-wide in subtropical areas and is a noxious weed in southern USA. Also grown in India as a wild cereal. [2014, 2015, 2016]

*Pennisetum petiolare* Chiov. (Petioled Fountain-grass). One of the Niger grasses which does not mature in Britain under glass until the following February. Occurs in north and northeast Africa but is killed by the first autumn frost when in cultivation. Better known by its synonym *Beckeropsis petiolaris* Fig. & De Not. [Every year]

*Pennisetum sphacelatum* (Nees) T. Durand & Schinz (Slender Veldt-grass). In all African tropical regions including Ethiopia. [2015, 2017, 2018]

*Phalaris canariensis* L. (Canary-grass). Originally from the Mediterranean region, it is now grown commercially around the world for birdseed and less commonly as a food. Very common in normal birdseed mixes but not so in Niger seed, presumably because it is easily separated. [2011, 2012, 2017, 2018]

*Setaria parviflora* (Poir.) Kerguelen (Knot-root Bristle-grass). Native to South America and the West Indies, now naturalised in Africa including Ethiopia. Very similar to *S. pumila* whose earlier Niger records may well include *S. parviflora*. [2015]

*Setaria pumila* Schult. subsp. *pallidifusca* (Schumach.) B.K. Simon (Yellow Bristle-grass). Native of the old world, this grass has spread to America in warmer areas. [2017]

*Setaria sphacelata* (Schumach.) Stapf & C.E. Hubb (African Bristle-grass). (Fig. 19) Native of South Africa and now found in Ethiopia where it is used to feed livestock. A very dramatic looking Niger impurity when grown. [2009-2015]

*Setaria verticillata* (L.) P. Beauv. (including *S. adhaerens* (Forssk.) Jauzein. (Rough Bristle-grass). A native of Europe but now widely introduced world-wide including Ethiopia; it can be a noxious weed there. [2012-2018]

*Setaria viridis* (L.) P. Beauv. (Green Bristle-grass). Another native of Europe but now occurring in most temperate area. In Ethiopia it is mainly found at high altitudes. Very common in mixed birdseed but oddly rare in Niger, recorded earlier (1975) but not since. [ – ]

*Snowdenia petitiانا* (A. Rich.) C.E. Hubb. (Fig. 20) This grass is found only in northeast Africa and Arabia. It is another species which will only mature under glass a full year after germination. Killed by the merest touch of frost. [2012-2018]. Originally this was misidentified back in 2009 as *Pennisetum nubicum* Schum. ex Engl.

*Sorghum bicolor* (L.) Moench (Great Millet or Sorghum). One of the world's earliest cultivated grains originating in Africa. It is the fifth most important cereal crop next to rice, wheat, maize and barley. In Ethiopia it was the initial crop on newly cultivated ground as it does not require much soil ploughing. Only a few but distinctive seeds have been extracted from Niger packets. [2013, 2015, 2016, 2018]

*Sorghum halepense* (L.) Pers. (Johnson-grass). Native to the Mediterranean area but it now grows on every continent except Antarctica. It can reduce erosion because of its spreading rhizomes but is generally regarded as a weed. Most packets of Niger seed contain half a dozen seeds of this grass but it never germinated except in 2010 and 2011. [2009-2018]

*Sporobolus panicoides* A. Rich (Famine Grass). A native of Africa and temperate Asia. In Ethiopia it is used as a famine food. Grown previously only in 1977 and not since. [ – ]

### **Acknowledgements**

My sincere thanks go to Eric Clement and Tom Cope for inspecting and naming the annual crop of herbarium specimens – several quite new to Britain. Also to Clive Stace who suggested this article in the first place and to Gwynn Ellis who typed the original script and made further suggestions.

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ISSN: 2632-4970

<https://doi.org/10.33928/bib.2019.01.292>



**Figure 1. *Trifolium spananthum***



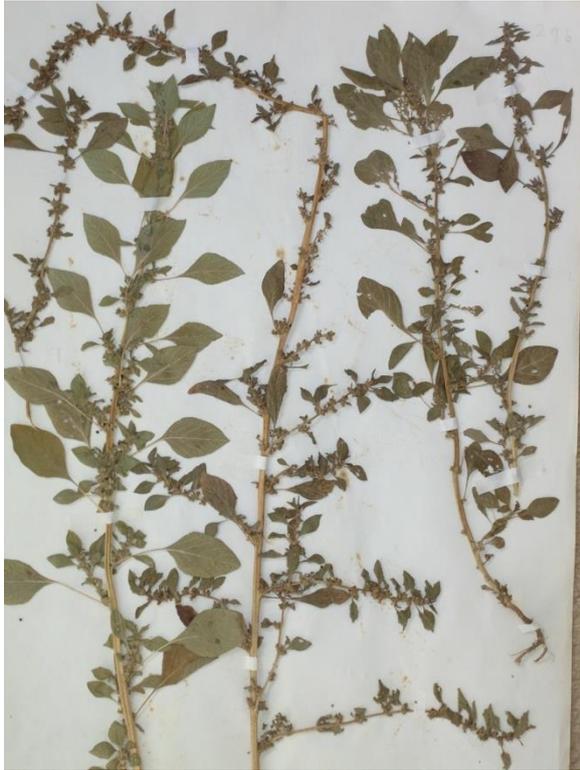
**Figure 2. *Caylusea abyssinica***



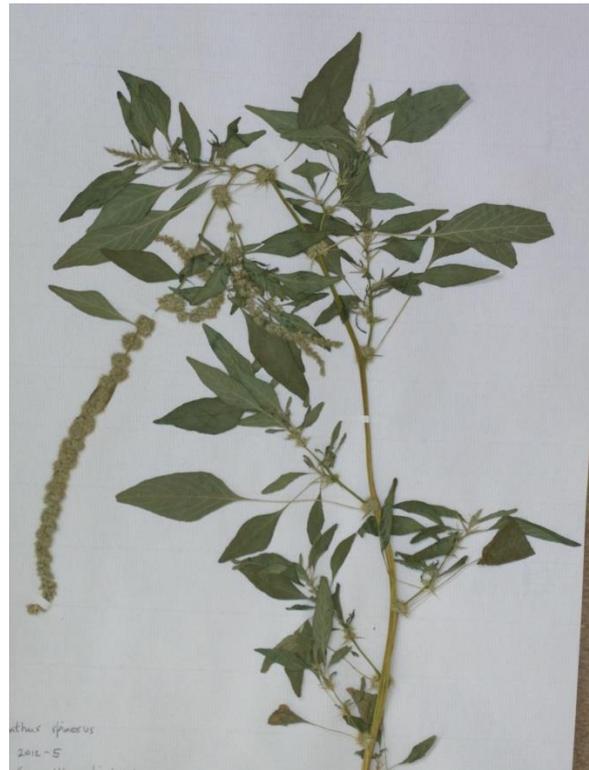
**Figure 3. *Brassica carinata***



**Figure 4. *Amaranthus blitum***



**Figure 5. *Amaranthus graecizans***



**Figure 6. *Amaranthus spinosus***



**Figure 7. *Nicandra physalodes***



**Figure 8. *Physalis angulata***



Figure 9. *Bidens pilosa*



Figure 10. *Crassocephalum rubens*



Figure 11. *Guizotia scabra*



Figure 12. *Parthenium hysterophorus*



**Figure 13. *Tagetes minuta***



**Figure 14. *Chloris virgata***



**Figure 15. *Dactyloctenium aegyptium***



**Figure 16. *Digitaria abyssinica***



Figure 17. *Eleusine indica* subsp. *africana*



Figure 18. *Eragrostis virescens*



Figure 19. *Setaria sphacelata*



Figure 20. *Snowdenia petitiana*