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Short Communication

Host plants of *Chrysodeixis includens* (Walker) (Lepidoptera, Noctuidae, Plusiinae)



Alexandre Specht^{a,*}, Silvana Vieira de Paula-Moraes^a, Daniel Ricardo Sosa-Gómez^b

^a Embrapa Cerrados, Planaltina, DF, Brazil

^b Embrapa Soja, Londrina, PR, Brazil

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ABSTRACT

This work has the objective to catalogue the information of *Chrysodeixis includens* (Walker, [1858]) (Lepidoptera: Noctuidae: Plusiinae) host plants. The list of plants comprehends new reports of host plants in Brazil and information from literature review around the world. It is listed 174 plants which are from 39 botanic families. The higher number of host plants of *C. includens* are in Asteraceae (29), Solanaceae (21), Fabaceae (18) and Lamiaceae (12).

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The soybean looper, *Chrysodeixis includens* (Walker, [1858]) (Lepidoptera: Noctuidae: Plusiinae) used to be part of the genus *Pseudoplusia* McDonnug, 1944, which it is monoespecific with four synonymys (Poole, 1989). However, based on the review of genital morphological characters of noctuid from Europe, Goater et al. (2003) proposed that *Pseudoplusia* it is a synonym of *Chrysodeixis* Hübner, [1821].

The soybean looper has been reported as a key pest of soybean crop in almost the whole American continent (e.g. Herzog, 1980; Barrionuevo et al., 2012; Moscardi et al., 2012). This species has a huge potential to cause defoliation (Herzog, 1980; Moscardi et al., 2012) and it is concentrated in the middle part of the plants which compromises the target at the time of pesticides spray. Also, by 2002/2003 soybean growers observed widespread damage caused by soybean looper throughout central Brazil and areas from north-east to the south region. Before 2002, soybean looper populations were restricted geographically and demanded occasional control measures. The explanation for this extensive occurrence is elusive. Soybean agricultural landscape is the dominant ecosystem during the spring and the summer, in Rio Grande do Sul, Paraná, Mato Grosso do Sul, São Paulo, Minas Gerais, Goiás, Mato Grosso and Bahia States. Therefore, in this non-diversified environment an increasing number of pests, such as soybean looper, a complex of tetranychid mites, and *Spodoptera* Guenée, 1852 species have

prospered. Among these species, *C. includens* had become a constant problem, being considered a key pest, requiring control in most of the growing soybean seasons. Other possible explanation to this phenomenon could be the suppression of their most important natural enemies, such as the complex of entomopathogenic fungi associated with this species due to fungicides application, especially after the introduction of soybean rust in Brazil (Sosa-Gómez et al., 2003, 2010).

Another important aspect of this species it is the high level of polyphagy. In literature is reported causing economic damage on table legumes (Genung, 1958), floricultural crops (Morishita et al., 1967), sweet corn ears (Janes and Grenee, 1970), “kiwicha” (Carrasco, 1987), yam (Santos et al., 2007) and passion flower (Benassi et al., 2012). It is also reported this species feeding on other host plants, including native and invasive species (e.g. Crumb, 1956; Silva et al., 1968; Tietz, 1972; Eichlin and Cunningham, 1978; Passoa, 1983; Coto et al., 1995; Heppner, 2003; Pastrana, 2004; Janzen and Hallwachs, 2009).

The objective of this study was to report new host plants of *C. includens* in Brazil and also catalogue the host plant information available in literature. The report of new host plants is from extensive sampling performed by the authors collecting larvae on detected host and rearing them to the adult stage for identification (Ward, 1988).

The literature search and author's records provided a list of 174 plants consumed by *C. includens*, belonging to 39 plant families. In Brazil, are recorded 26 host plants that had not been previously reported (Table 1). The botanical families with the greatest number

* Corresponding author.

E-mail: alexandre.specht@embrapa.br (A. Specht).

Table 1

Botanical families (in bold), scientific names, common names (in colchetes) of host plants of *Chrysodeixis includens* larvae recorded in several bibliographic sources and new records from Brazil (in parenthesis).

Alismataceae – <i>Sagittaria</i> sp. (28);
Amaranthaceae – <i>Amaranthus caudatus</i> L. {kiwicha} (22); <i>Amaranthus deflexus</i> L. (*); <i>Amaranthus hibridus</i> L. (*); <i>Amaranthus spinosus</i> L. (*); <i>Amaranthus</i> sp. (12, 16, 19, 35); <i>Celosia cristata</i> L. (*); <i>Spinacia oleracea</i> L. (11, 33);
Apiaceae – <i>Apium graveolens</i> L. {celery} (12, 19, 27, 35); <i>Daucus carota</i> L. {carrot} (35); <i>Eryngium foetidum</i> L. (35); <i>Petroselinum crispum</i> (Mill.) Nyman ex A.W. Hill (11, 35);
Araceae – <i>Philodendron</i> sp. (19, 35);
Araliaceae – <i>Schefflera actinophylla</i> (Endl.) Harms {umbrella tree} (19, 35);
Asteraceae – <i>Ageratum conyzoides</i> L. (11, 33); <i>Aster</i> sp. (10, 19, 35); <i>Calendula officinalis</i> L. {pot marigold} (10, 12, 19, 35, 35); <i>Bidens pilosa</i> L. (*); <i>Chrysanthemum moriflorum</i> Ramat (27); <i>Chrysanthemum</i> sp. (10, 18, 19, 20, 23, 33, 35); <i>Clibadium surinamense</i> L. (31); <i>Conyza bonariensis</i> (L.) (31); <i>Conyza canadensis</i> (L.) Cron. (16, 19); <i>Emilia fosbergii</i> Nicolson (31); <i>Eupatorium</i> sp. (15, 18, 19, 20, 23, 27, 33, 35); <i>Galinsoga</i> sp. (12); <i>Gerbera jamesonii</i> Bolus {African daisy} (10, 19, 35); <i>Helianthus annuus</i> L. {sunflower} (14, 19, 27, 33, 35); <i>Helianthus</i> spp. (16, 19); <i>Lactuca sativa</i> L. {lettuce} (4, 11, 12, 18, 20, 19, 23, 24, 33, 35); <i>Lactuca serriola</i> L. (33) <i>Mikania cordifolia</i> (L.) Willd. (*); <i>Millieria quinqueflora</i> L. (31); <i>Parthenium hysterophorus</i> L. (33); <i>Parthenium</i> sp. (16, 19); <i>Senecio cineraria</i> DC. {dusty miller} (10, 19, 35); <i>Solidago</i> sp. (18, 19, 20, 23, 33, 35); <i>Sonchus</i> spp. (16, 19, 35); <i>Sonchus oleraceus</i> Linn (*); <i>Verbesina gigantea</i> Jacq. (31); <i>Verbesina turbacensis</i> Kunth (31); <i>Vernonia tweedieana</i> Baker (*); <i>Xanthium strumarium</i> L. (17, 19, 35);
Balsaminaceae – <i>Impatiens sultani</i> Hook (*);
Begoniaceae – <i>Begonia</i> sp. (19, 35);
Brassicaceae – <i>Brassica napus</i> L. var. <i>oleifera</i> (*); <i>Brassica oleracea</i> L. var. <i>acephala</i> L. {collard} (11, 16, 17, 18, 19, 20, 23, 25, 27, 28, 33, 35); <i>Brassica oleracea</i> L. var. <i>botrytis</i> L. {broccoli} (16, 19, 28, 35); <i>Brassica oleracea</i> L. var. <i>capitata</i> L. {cabbage} (11, 12, 16, 17, 19, 20, 21, 25, 28, 35); <i>Eruca sativa</i> Gars. (*); <i>Lepidium virginicum</i> L. (16, 19, 35); <i>Matthiola incana</i> (L.) W.T. Aiton {stock} (10, 19, 35); <i>Nasturtium officinale</i> R.Br. {watercress} (19, 27, 35);
Cannabaceae – <i>Trema micrantha</i> (L.) Blum. (31);
Caryophyllaceae – <i>Dianthus caryophyllus</i> L. {carnation} (10, 19, 35);
Chenopodiaceae – <i>Beta vulgaris</i> L. (11, 33); <i>Beta vulgaris</i> L. var. <i>cicla</i> L. (11, 33); <i>Chenopodium album</i> L. (16, 19, 33, 35); <i>Chenopodium</i> sp. (12);
Commelinaceae – <i>Commelina</i> sp. (18, 20, 23, 33); <i>Tradescantia zebrina</i> (Schinz) D.R. Hunt (4, 15, 18, 19, 20, 23, 27, 33);
Convolvulaceae – <i>Ipomoea batatas</i> (L.) Lam. {sweet potato} (8, 19, 25, 27, 33, 35); <i>Ipomoea grandiflora</i> L. {Moonflower} (*); <i>Ipomoea purpurea</i> Roth (19);
Cucurbitaceae – <i>Cucumis sativus</i> L. {cucumber} (33, 35); <i>Citrullus lanatus</i> var. <i>lanatus</i> (Thumb.) Matsum. & Naka {watermelon} (19, 35); <i>Citrullus</i> sp. (27); <i>Fevillea cordifolia</i> L. (*); <i>Sechium edule</i> (Jacq.) Sw. (25);
Dioscoreaceae – <i>Dioscorea</i> sp. {yam} (30);
Euphorbiaceae – <i>Acalypha macrostachya</i> Jacq. (31); <i>Croton capitatus</i> Michx. (4, 18, 19, 20, 23, 33); <i>Manihot esculenta</i> Crantz (*); <i>Phyllanthus urinaria</i> L. (*); <i>Euphorbia pulcherrima</i> Willd. ex Klotzsch {poinsettia} (10, 19, 35);
Fabaceae – <i>Arachis hypogaea</i> L. {peanut} (9, 19, 35); <i>Cajanus cajan</i> (L.) Millsp. {pigeon pea} (27, 33, 35); <i>Centrosema sagittatum</i> (Humb. & Bonpl. ex Willd.) Brandegee ex Riley (31); <i>Crotalaria spectabilis</i> Roth. (*); <i>Cyamopsis tetragonoloba</i> (L.) Taubert {guar} (14, 19, 35); <i>Desmodium pubulare</i> Hoehne (11, 33); <i>Glycine max</i> (L.) Merril. {soybean} (2, 6, 17, 18, 19, 20, 21, 23, 24, 25, 27, 28, 33, 35); <i>Lathyrus odoratus</i> L. (2, 23, 33); <i>Medicago sativa</i> L. {lucerne} (4, 18, 19, 20, 23, 24, 28, 33, 35); <i>Mucuna pruriens</i> var. <i>Utilis</i> (Wall. Ex Wight) Backer ex. Burk (31); <i>Phaseolus lunatus</i> L. {lima bean} (19, 33, 35); <i>Phaseolus polystachios</i> (L.) Britton, Sterns & Poggenb. (24, 33); <i>Phaseolus vulgaris</i> L. {common bean} (11, 12, 17, 19, 20, 21, 25, 27, 28, 33, 35); <i>Pisum sativum</i> L. {pea} (9, 11, 19, 28, 33, 35); <i>Pueraria montana</i> (Lour.) Merr. (Kudzu) (26, 35); <i>Trifolium</i> sp. (28); <i>Vicia faba</i> L. (*); <i>Vignum unguiculata</i> (L.) Walp. {cowpea} (2, 19, 23, 27, 33, 35);
Geraniaceae – <i>Geranium</i> sp. (4, 18, 19, 20, 23, 27, 33); <i>Pelargonium hortorum</i> L.H. Bailey (27); <i>Pelargonium</i> sp. (15, 18, 19, 20, 23, 27, 33);
Gesneriaceae – <i>Saintpaulia ionantha</i> Wendl. {African violet} (10, 19, 35); <i>Saintpaulia</i> sp. (27);
Hydrangeaceae – <i>Hydrangea</i> sp. (10, 19, 35);
Iridaceae – <i>Gladiolus</i> sp. (23, 33);
Lamiaceae – <i>Aeollanthus suavis</i> Mart. (33); <i>Coleus</i> sp. (18, 20, 23); <i>Hyptis capitata</i> Jacq. (31); <i>Hyptis obtusifolia</i> R.Br. (31); <i>Ocimum basilicum</i> L. (11); <i>Melissa officinalis</i> L. (11); <i>Mentha arvensis</i> L. var. <i>piperacens</i> Malinvaud. (*); <i>Mentha spicata</i> L. Garden mint (*); <i>Mentha</i> sp. (5, 19, 33, 35); <i>Salvia hispanica</i> L. (11, 33); <i>Solenostemon scutellarioides</i> (L.) Codd [= <i>hybridus</i>] (10, 19); <i>Teucrium vesicarium</i> Mill. Germander (31);
Lauraceae – <i>Persea americana</i> Mill. {avocado} (18, 19, 20, 23, 33, 35);
Liliaceae – <i>Alstroemeria</i> sp. (32); <i>Allium sativum</i> L. {garlic} (19, 27); <i>Asparagus officinalis</i> L. {asparagus} (35); <i>Asparagus retrofractus</i> L. (10, 19, 35); <i>Asparagus setaceus</i> (Kunth) J.P. Jessop (33)
Linaceae – <i>Linum usitatissimum</i> L. (11, 28, 33);
Malvaceae – <i>Abelmoschus esculentus</i> (L.) Moench {okra} (1, 18, 19, 20, 23, 27, 33, 35); <i>Gossypium hirsutum</i> L. {cotton} (3, 11, 18, 19, 20, 23, 24, 25, 33, 35); <i>Hibiscus rosa-sinensis</i> L. (*); <i>Luehea seemannii</i> Planch. & Triana (31); <i>Sida rhombifolia</i> L. (*);
Oxalidaceae – <i>Oxalis</i> sp. (23, 33);
Passifloraceae – <i>Passiflora edulis</i> Sims. (34); <i>Passiflora incarnata</i> L. (16, 19);
Pedaliaceae – <i>Martynia annua</i> L. (31); <i>Sesamum indicum</i> L. (25, 33);
Peperaceae – <i>Peperomia obtusifolia</i> (L.) A. Dietr. {pepper-face} (19, 27, 35); <i>Peperomia</i> sp. (27);
Poaceae – <i>Andropogon schoenanthus</i> L. (33); <i>Lolium perene</i> L. (*); <i>Oryza sativa</i> L. (25); <i>Saccharum officinarum</i> L. {sugarcane} (35); <i>Sorghum bicolor</i> (L.) Moench {sorghum} (35); <i>Triticum aestivum</i> L. (*); <i>Zea mays</i> L. {maize} (12, 13, 19, 25, 35);
Polygonaceae – <i>Rumex crispus</i> L. (*); <i>Rumex</i> sp. {dock} (16, 19, 35);
Portulacaceae – <i>Portulaca oleracea</i> L. {purslane} (16, 19, 35); <i>Portulaca grandiflora</i> Hook (*);
Rosaceae – <i>Malus domestica</i> Borkhausen {apple} (29);
Rubiaceae – <i>Coffea arabica</i> L. (25); <i>Ixora coccinea</i> L. (19, 35); <i>Ixora</i> sp. (27);
Solanaceae – <i>Capsicum annuum</i> L. {bell pepper} (17, 35); <i>Cestrum glanduliferum</i> Kerber ex Francey (31); <i>Cestrum megalophyllum</i> Dunal (31); <i>Cestrum racemosum</i> Ruiz & Pav. (31); <i>Cyphomandra batavea</i> (Cav.) Sendtn. {tree tomato} (19, 27, 35); <i>Lycopersicon esculentum</i> Mill. {tomato} (9, 11, 12, 17, 18, 19, 20, 21, 23, 24, 25, 27, 28, 31, 33, 35); <i>Nicotiana alata</i> Link & Otto (11, 33); <i>Nicotiana rustica</i> L. (16, 19, 35); <i>Nicotiana sanderae</i> hort. ex W. Watson (pro sp.) (33); <i>Nicotiana tabacum</i> L. {tobacco} (4, 11, 17, 18, 19, 20, 23, 24, 33, 35); <i>Physalis</i> sp. {groundcherry} (16, 19, 35); <i>Solanum americanum</i> Schultz (21, 34); <i>Solanum hayesii</i> Fernald (31); <i>Solanum aligerum</i> Schldtl. [= <i>Solanum grossum</i>] (16, 19); <i>Solanum jamaicense</i> Mill. (31); <i>Solanum melongena</i> L. {eggplant} (35); <i>Solanum nigrescens</i> M. Martens & Galeotti [= <i>Solanum gracile</i>] (19); <i>Solanum torvum</i> Sw. (31, 33); <i>Solanum tuberosum</i> L. {potato} (2, 7, 11, 19, 23, 27, 33, 35); <i>Solanum</i> sp. "Husk tomato" (16, 19); <i>Solanum</i> sp. "Purple nightshade" (16, 19);
Urticaceae – <i>Myriocarpa longipes</i> Liebm. (31); <i>Phenax</i> sp. (31); <i>Urera bacifera</i> (L.) Gaudich. ex Wedd. (*); <i>Urtica dioica</i> L. (2, 23);
Verbenaceae – <i>Lantana montevidensis</i> (Spreng.) Briq. (19); <i>Lantana</i> sp. (18, 20, 23, 33, 35); <i>Verbena</i> spp. (16, 19, 35).

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of plants consumed include Asteraceae (29), Solanaceae (21), Fabaceae (18), Lamiaceae (12), Brassicaceae (8), Poaceae (7), Amaranthaceae (6), Euphorbiaceae and Malvaceae (5). Beside the large number of cultivated species, the large number of weeds and native plants stand out.

A wide range of cultivated and wild host plant species listed in this study (Table 1) demonstrated that *C. includens* it is a polyphagous pest with potential to cause economic impact in several crops, specially in soybean (Herzog, 1980; Moscardi et al., 2012). Also, in the Brazilian landscape, the great diversity of host plants disponibility guarantees survival and persistence of this species, even in the off season, maintain populations of *C. includes* in alternative hosts which plays the role of pest source to crops in the following season.

Conflicts of interest

The authors declare no conflicts of interest.

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