Appendix S1. References used in meta-analysis of Canada thistle management in annual cropping systems:

Armel GR, Hall GJ, Wilson HP, Cullen N (2005) Mesotrione plus atrazine mixtures for control of Canada thistle (*Cirsium arvense*). Weed Sci 53: 202-211

Asadi G, Ghorbani R, Karimi J, Bagheri A, Mueller-Schaerer H (2013) Host impact and specificity of tortoise beetle (*Cassida rubiginosa*) on Canada thistle (*Cirsium arvense*) in Iran. Weed Technol 27: 405-411

Bicksler AJ, Masiunas JB (2009) Canada thistle (*Cirsium arvense*) suppression with buckwheat or sudangrass cover crops and mowing. Weed Technol 23: 556-563

Blasko D, Nemeth I (2006) Efficiency and long-term effects of certain herbicides against Canada thistle (*Cirsium arvense* (L.) scop.). J Plant Dis Prot: 739-745

Bondarenko DD (1957) 3-amino-1,2,4-triazole as an herbicide on Canada thistle [*Cirsium arvense* (L.) Scop.] and its effect on soil microorganisms. Ph.D dissertation. Columbus, OH: The Ohio State University. 125 p

Brosten BS, Sands DC (1986) Field trials of *Sclerotinia sclerotiorum* to control Canada thistle (*Cirsium arvense*). Weed Sci 34: 377-380

Carlson SJ, Donald WW (1988) Fall-applied glyphosate for Canada thistle (*Cirsium arvense*) control in spring wheat (*Triticum aestivum*). Weed Technol 2: 445-455

Carson AG, Bandeen JD (1975) Chemical control of Canada thistle. Weed Sci 23: 116-118

Causey M, Webb F (1990) Canada thistle control in field corn. Pages 82-83 *in* Proceedings of the Northeastern Weed Science Society

Curtis RE and Haagsma T (1986) Selective control of Canada thistle in cereals with 3,6-dichloropicolinic acid (clopyralid). Pages 159-166 *in* Proceedings of the Western Society of Weed Science

Darwent AL, Kirkland K, Baig M, Lefkovitch L (1994) Preharvest applications of glyphosate for Canada thistle (*Cirsium arvense*) control. Weed Technol 8: 477-482

Davies CJ, Orson JH (1987) The control of *Cirsium arvense* (creeping thistle) by sulfonyl urea herbicides and a comparison of methods of assessing efficacy. Pages 453-460 *in* Proceedings of the British Crop Protection Conference. British Crop Protection Council

Derscheid LA, Nash RL, Wicks GA (1961) Thistle control with cultivation, cropping and chemicals. Weeds 9: 90-102

Donald WW (1993) Retreatment with fall-applied herbicides for Canada thistle (*Cirsium arvense*) control. Weed Sci 41: 434-440

Donald WW, Prato T (1992a) Effectiveness and economics of repeated sequences of herbicides for Canada thistle (*Cirsium arvense*) control in reduced-till spring wheat (*Triticum aestivum*). Can J Plant Sci 72: 599-618

Donald WW, Prato T (1992b) Efficacy and economics of herbicides for Canada thistle (*Cirsium arvense*) control in no-till spring wheat (*Triticum aestivum*). Weed Sci 40: 233-240

Farvani M, Khalghani J (2004) Synchronized weed chemical control and wheat harvesting. J Food Agric Env 2: 202-204

Glenn S, Heimer L (1994) Canada thistle (*Cirsium arvense*) control in no-tillage corn (*Zea mays*). Weed Technol 8: 134-138

Graglia E, Melander B, Jensen RK (2006) Mechanical and cultural strategies to control *Cirsium arvense* in organic arable cropping systems. Weed Res 46: 304-312

Gronwald J, Plaisance K, Ide D, Wyse D (2002) Assessment of *Pseudomonas syringae* pv. *tagetis* as a biocontrol agent for Canada thistle. Weed Sci 50: 397-404

Hodgson JM (1958) Canada thistle (*Cirsium arvense* Scop.) control with cultivation, cropping, and chemical sprays. Weeds 6: 1-11

Hoeft E, Jordan N, Zhang J (2001) Integrated cultural and biological control of Canada thistle in conservation tillage soybean. Weed Sci 49: 642-646

Howatt KA, Endres GJ, Hendrickson PE, Aberle EZ, Lukach JR, Jenks BM, Riveland NR, Valenti SA, Rystedt CM (2006) Evaluation of glyphosate-resistant hard red spring wheat (*Triticum aestivum*). Weed Technol 20: 706-716

Kirkland K (1977) Glyphosate for control of Canada thistle on summer fallow. Can J Plant Sci 57: 1015-1017

Kluth S, Kruess A, Tscharntke T (2005) Effects of two pathogens on the performance of *Cirsium arvense* in a successional fallow. Weed Res 45: 261-269

Kwiatkowski C (2009) The consequent influence of crop rotation and six-year-long spring barley monoculture on yields and weed infestation of white mustard and oats. Acta Agrobot 62: 241-247

Lym RG, Deibert KJ (2005) Diflufenzopyr influences leafy spurge (*Euphorbia esula*) and Canada thistle (*Cirsium arvense*) control by herbicides. Weed Technol 19: 329-341

McKay HC (1959) Control Canada thistle for greater profits. University of Idaho Rep 321. 16 p

McKone MB (1989) Canada thistle *Cirsium arvense* (L.) Scop. control with clopyralid + 2,4-D alone and tankmixed with metsulfuron. Pages 271-273 *in* Proceedings of the Western Society of Weed Science

Miller BR, Lym RG (1998) Using the rosette technique for Canada thistle (*Cirsium arvense*) control in row crops. Weed Technol 12: 699-706

Miller SD (1987) Canada thistle control in barley. Western Society of Weed Science, p 270

Miller SD, Dalrymple AW, Lauer J (1989) Canada thistle and volunteer alfalfa control in barley. Western Society of Weed Science, p 259-260

Miller SD, Mesbah A, Fornstrom KJ (1994) Canada thistle control and competition in sugarbeets. J Sugar Beet Res 31: 87-96

Naish RW (1975) Dowco 290 --a new growth regulator herbicide. Pages 177-180 *in* Proceedings of the New Zealand Weed and Pest Control Conference. New Zealand Plant Protection Society.

O'Donovan J, Blackshaw R, Harker K, McAndrew D, Clayton G (2001) Canada thistle (*Cirsium arvense*) management in canola (*Brassica rapa*) and barley (*Hordeum vulgare*) rotations under zero tillage. Can J Plant Sci 81: 183-190

O'Sullivan P, Kossatz V (1982) Selective control of Canada thistle in rapeseed with 3,6-dichloropicolinic acid. Can J Plant Sci 62: 989-993

O'Sullivan PA (1982) Response of various broad-leaved weeds, and tolerance of cereals, to soil and foliar applications of DPX-4189. Can J Plant Sci 62: 715-724

O'Sullivan PA, Kossatz V (1984a) Canada thistle suppression and rapeseed tolerance with dicamba and picloram. Can J Plant Sci 64: 971-978

O'Sullivan PA, Kossatz V (1984b) Control of Canada thistle and tolerance of barley to 3,6-dichloropicolinic acid. Can J Plant Sci 64: 215-217

Parochetti JV (1974) Canada thistle control with atrazine. Weed Sci 22: 28-31

Rabcewicz J (1995) Mechanical weed control by shallow cultivation with three vertical - axis rotary implements. J Fruit Ornam Plant Res 3: 125-142

Renner KA (1991) Canada thistle (*Cirsium arvense*) control in sugarbeet with clopyralid. Weed Technol 5: 392-395

Selleck G, Baird D (1981) Antagonism with glyphosate and residual herbicide combinations. Weed Sci 29: 185-190

Singh S, Malik R (1992) Evaluation of clopyralid against *Cirsium arvense*. Tests Agrochem Cultiv 13: 46-47

Terry HJ, Wilson CW (1964) A field study of the factors affecting the herbicidal activity of ioxynil and bromoxynil and their tolerance by cereals. Weed Res 4: 196-215

Thomsen MG, Mangerud K, Riley H, Brandsæter LO (2015) Method, timing and duration of bare fallow for the control of *Cirsium arvense* and other creeping perennials. Crop Prot 77: 31-37

Tolimir M, Veskovic M, Komljenovic I, Djalovic I, Stipesevic B (2006) Influences of soil tillage and fertilization on maize yield and weed infestation. Cereal Res Commun 34: 323-326

Warden RL (1964) Tordon for the control of field bindweed and Canada thistle in the North Central United States. Down Earth 20: 6-10

Warnes DD (1974) Integrated systems for control of Canada thistle in corn. Pages 95-97 *in* Proceedings of the North Central Weed Control Conference. North Central Weed Science Society.

Wedryk S, Cardina J (2012) Evaluation of tef as a smother crop during transition to organic management. Weed Technol 26: 102-109

Westra P, D'Amato T (1988) Canada thistle control prior to planting winter wheat. Western Society of Weed Science, p 9-10

Zimdahl R, Foster G (1993) Canada thistle (*Cirsium arvense*) control with disking and herbicides. Weed Technol 7: 146-149

Zimdahl RL, Foster JM (1974) Canada thistle control. Fort Collins, CO: Colorado Agricultural Experiment Station. 4 p

Zimdahl RLZ, P.S. (1979) Canada thistle control. Fort Collins, CO: Colorado Agricultural Experiment Station. 3 p

Zuris N, Wilson R, and Nelson L (1987) Effects of plant growth stage on chlorsulfuron suppression of Canada thistle (*Cirsium arvense*) shoots and roots. Weed Technol 1: 10-13

Appendix S2. References used in meta-analysis of Canada thistle management in perennial systems:

Almquist TL, Lym RG (2010) Effect of aminopyralid on Canada thistle (*Cirsium arvense*) and the native plant community in a restored tallgrass prairie. Invasive Plant Sci Manag 3: 155-168

Amor RL, Harris RV (1977) Control of *Cirsium arvense* (L) Scop. by herbicides and mowing. Weed Res 17: 303-309

Beck KG (1988) Canada thistle control in a non-grazed Colorado pasture. Western Society of Weed Science, p 4-5

Beck KG, Hanson DE, Sebastian JR (1989) Canada thistle control with chlorflurenol, dicamba, and clopyralid in a Colorado pasture. Western Society of Weed Science, p 27-28

Biesboer DD, Koukkari WL, Darveaux B (1994) Controlling leafy spurge and Canada thistle by competitive species. Minnesota Department of Transportation. 90 p

Bixler LL, Carrithers VF, Cooley AW (1991) Canada thistle control at two stages of plant growth with clopyralid. Pages 44-47 *in* Proceedings of the Western Society of Weed Science

Boerboom C, Wyse D (1988) Response of Canada thistle (*Cirsium arvense*) and birdsfoot-trefoil (*Lotus corniculatus*) to bentazon. Weed Sci 36: 250-253

Bourdot G, Harvey I, Hurrell G, Alexander R (1993) An experimental mycoherbicide utilizing *Sclerotinia sclerotiorum* controls pasture populations of *Cirsium arvense* in Canterbury. Pages 251-256 *in* Proceedings of the New Zealand Plant Protection Conference. New Zealand Plant Protection Society

Bourdot G, Hurrell G, Saville D, Leathwick D (2006) Impacts of applied *Sclerotinia sclerotiorum* on the dynamics of a *Cirsium arvense* population. Weed Res 46: 61-72

Bourdot GW, Hurrell GA, Saville DJ (2004) Wounding of *Cirsium arvense* enhances the efficacy of *Sclerotinia sclerotiorum* as a mycoherbicide. N Z Plant Protect 57: 292-297

Bultsma PM, Lamming F, Whitson TD (1992) Comparison of several herbicides applied at different growth stages for control of Canada thistle (*Cirsium arvense*) and musk thistle (*Carduus nutans*). Western Society of Weed Science, p I-9

Celebi SZ, Kaya I, Korhan Sahar A, Yergin R (2010) Effects of the weed density on grass yield of alfalfa (*Medicago sativa* L.) in different row spacing applications. Afr J Biotechnol 9: 6867-6872

Clements LJ, Salter AM, Banks CJ, Poppy GM (2012) The usability of digestate in organic farming. Water Sci Technol 66: 1864-1870

Derscheid LA, Nash RL, Wicks GA (1961) Thistle control with cultivation, cropping and chemicals. Weeds 9: 90-102

Enloe SF, Lym RG, Wilson R, Westra P, Nissen S, Beck G, Moechnig M, Peterson V, Masters RA, Halstvedt M (2007) Canada thistle (*Cirsium arvense*) control with aminopyralid in range, pasture, and noncrop areas. Weed Technol 21: 890-894

Foote L, Kill D, Williams C (1970) Canada thistle control on roadsides. Weed Sci 18: 307-310

Gaisler J, Pavlu V, Hejcman M (2008) Effect of different defoliation practices on weeds in an upland meadow. J Plant Dis Prot XXI: 541-546

Gallagher A, Vandenborn W (1976) Tolerance of creeping red fescue and timothy to herbicides used to control Canada thistle. Can J Plant Sci 56: 331-338

Gramig GG, Ganguli AC (2015) Managing Canada thistle (*Cirsium arvense*) in a constructed grassland with aminopyralid and prescribed fire. Invasive Plant Sci Manag 8: 243-249

Grekul CW, Bork EW (2007) Fertilization augments Canada thistle (*Cirsium arvense* L. Scop) control in temperate pastures with herbicides. Crop Prot 26: 668-676

Harrington TB, Peter DH, Devine WD (2014) Two-year effects of aminopyralid on an invaded meadow in the Washington Cascades. Invasive Plant Sci Manag 7: 14-24

Hartley MJ, James TK (1979) Cost benefit of selective control of Californian thistle in pasture. Pages 245-249 *in* Proceedings of the New Zealand Weed and Pest Control Conference. New Zealand Plant Protection Society

Hartley MJ, Thomson NA (1982) Effect and control of Californian thistle in dairy pasture. Pages 104-107 *in* Proceedings of the New Zealand Weed and Pest Control Conference. New Zealand Plant Protection Society

Harvey I, Waipara N, Bourdot G (1993) Sclerotium populations after inundative application of *Sclerotinia sclerotiorum* to Californian thistle. Pages 265-269 *in* Proceedings of the New Zealand Plant Protection Conference. New Zealand Plant Protection Society

Harvey IC, Bourdot GW, Saville DJ, Sands DC (1998) A comparison of auxotrophic and wild strains of *Sclerotinia sclerotiorum* used as a mycoherbicide against Californian thistle (*Cirsium arvense*). Biocontrol Sci Technol 8: 73-81

Hodgson JM (1958) Canada thistle (*Cirsium arvense* Scop.) control with cultivation, cropping, and chemical sprays. Weeds 6: 1-11

Hurrell G, Bourdot G (1996) *Sclerotinia sclerotiorum* and mowing independently reduce Californian thistle in a sheep pasture. Pages 225-228 *in* Proceedings of the New Zealand Plant Protection Conference. New Zealand Plant Protection Society

Hurrell GA, Bourdôt GW (2001) Wounding of weeds enhances *Sclerotinia sclerotiorum* as a mycoherbicide. Pages 137-138 *in* Proceedings of the XI Internal Sclerotinia Workshop. UK: British Society for Plant Pathology

Krueger-Mangold J, Sheley RL, Roos BD (2002) Maintaining plant community diversity in a waterfowl production area by controlling Canada thistle (*Cirsium arvense*) using glyphosate. Weed Technol 16: 457-463

McKay HC (1959) Control Canada thistle for greater profits. University of Idaho Rep 321. 16 p

Meeklah FA, Mitchell RB (1984) Evaluation of herbicides for control of Californian thistle. Pages 20-23 *in* Proceedings of the New Zealand Weed and Pest Control Conference. New Zealand Plant Protection Society

Melichar MW, Stafford MP (1989) Control of Canada thistle and musk thistle on roadside rights-of-way with clopyralid and 2,4-D. Pages 72-73 *in* Proceedings of the Northeastern Weed Science Society

Mesbah AO, Miller SD (2005) Canada thistle (*Cirsium arvense*) control in established alfalfa (*Medicago sativa*) grown for seed production. Weed Technol 19: 1025-1029

Peterson SC, Parochetti JV (1978) Canada thistle (*Cirsium arvense*) control in timothy (*Phleum pratense*) and red-clover (*Trifolium pratense*) sward. Weed Sci 26: 215-220

Samuel LW, Lym RG (2008) Aminopyralid effects on Canada thistle (*Cirsium arvense*) and native plant species. Invasive Plant Sci Manag 1: 265-278

Sebastian JR, Beck KG, Owsley CJ (1992) Canada thistle control with metsulfuron, picloram, 2,4-D, and split applications of 2,4-D and the sulfonylureas. Western Society of Weed Science. 2 p

Thrasher FP, Cooper CS, Hodgson JM (1963) Competition of forage species with Canada thistle, as affected by irrigation and nitrogen levels. Weeds 11: 136-138

Tipping PW (2001) Canada thistle (*Cirsium arvense*) control with hexazinone in crown vetch (*Coronilla varia*). Weed Technol 15: 559-563

Travnicek A, Lym R, Prosser C (2005) Fall-prescribed burn and spring-applied herbicide effects on Canada thistle control and soil seedbank in a northern mixed-grass prairie. Rangeland Ecol Manag 58: 413-422

Vantoor R (1994) Effect of applying glyphosate and clopyralid by rotary weed wiper on Californian thistle in Southland. Pages 91-92 *in* Proceedings of the New Zealand Plant Protection Conference. New Zealand Plant Protection Society

Wedryk S, Cardina J (2012) Smother crop mixtures for Canada thistle (*Cirsium arvense*) suppression in organic transition. Weed Sci 60: 618-623

Whitson TD, Ferrell MA (1986) Evaluation of herbicides for Canada thistle control. Western Society of Weed Science. p 55

Wilson R, Kachman S (1999) Effect of perennial grasses on Canada thistle (C*irsium arvense*) control. Weed Technol 13: 83-87

Wilson RG, Martin AR, Kachman SD (2006) Seasonal changes in carbohydrates in the root of Canada thistle (*Cirsium arvense*) and the disruption of these changes by herbicides. Weed Technol 20: 242-248

Wilson RG, Michiels A (2003) Fall herbicide treatments affect carbohydrate content in roots of Canada thistle (*Cirsium arvense*) and dandelion (*Taraxacum officinale*). Weed Sci 51: 299-304