Appendix 1. Numbered list of 62 articles used in a previous review (Poveda et al. 2008), including 45 articles used in the present meta-analysis; numbers 1, 3, 9, 10, 13, 15, 23, 24, 31, 32, 35, 38, 41, 42, 43, 47, and 49 did not meet criteria concerning data reporting or plant richness treatments for the meta-analysis.

1. Adeniyi, O. R. 2001. An economic evaluation of intercropping with tomato and okra in a rain forest zone of Nigeria. Journal of Horticultural Science & Biotechnology **76**:347-349.
2. Badenes-Perez, F. R., A. M. Shelton, and B. A. Nault. 2005. Using yellow rocket as a trap crop for diamondback moth (Lepidoptera : Plutellidae). Journal of Economic Entomology **98**:884-890.
3. Begum, M., G. M. Gurr, S. D. Wratten, P. R. Hedberg, and H. I. Nicol. 2006. Using selective food plants to maximize biological control of vineyard pests. Journal of Applied Ecology **43**:547-554.
4. Bell, V. A., R. J. Brightwell, and P. J. Lester. 2006. Increasing vineyard floral resources may not enhance localised biological control of the leafroller *Epiphyas postvittana* (Lepidoptera : Tortricidae) by *Dolichogenidea* spp. (Hymenoptera : Braconidae) parasitoids. Biocontrol Science and Technology **16**:1031-1042.
5. Bender, D. A., W. P. Morrison, and R. E. Frisbie. 1999. Intercropping cabbage and Indian mustard for potential control of lepidopterous and other insects. Hortscience **34**:275-279.
6. Berndt, L. A., S. D. Wratten, and S. L. Scarratt. 2006. The influence of floral resource subsidies on parasitism rates of leafrollers (Lepidoptera : Tortricidae) in New Zealand vineyards. Biological Control **37**:50-55.

7. Bjorkman, M., P. A. Hamback, and B. Ramert. 2007. Neighbouring monocultures enhance the effect of intercropping on the turnip root fly (*Delia floralis*). Entomologia Experimentalis et Applicata **124**:319-326.
8. Bukovinszky, T., H. Trefas, J. C. van Lenteren, L. E. M. Vet, and J. Fremont. 2004. Plant competition in pest-suppressive intercropping systems complicates evaluation of herbivore responses. Agriculture Ecosystems & Environment **102**:185-196.
9. Bullas-Appleton, E. S., C. Gillard, and A. W. Schaafsma. 2005. Aggregation of potato leaf hoppers, *Empoasca fabae* (Harris) (Homoptera: Cicadellidae), on a trap crop in an edible bean, *Phaseolus vulgaris* L., intercropping system. Canadian Journal of Plant Science **85**:237-242.
10. Butts, R. A., K. D. Floate, M. David, R. E. Blackshaw, and P. A. Burnett. 2003. Influence of intercropping canola or pea with barley on assemblages of ground beetles (Coleoptera: Carabidae). Environmental Entomology **32**:535-541.
11. Cai, H. J., Z. S. Li, and M. S. You. 2007. Impact of habitat diversification on arthropod communities: A study in the fields of Chinese cabbage, *Brassica chinensis*. Insect Science **14**:241-249.
12. Chabi-Olaye, A., C. Nolte, F. Schulthess, and C. Borgemeister. 2005. Abundance, dispersion and parasitism of the stem borer *Busseola fusca* (Lepidoptera : Noctuidae) in maize in the humid forest zone of southern Cameroon. Bulletin of Entomological Research **95**:169-177.
13. Chabi-Olaye, A., C. Nolte, F. Schulthess, and C. Borgemeister. 2005. Relationships of intercropped maize, stem borer damage to maize yield and land-

use efficiency in the humid forest of Cameroon. Bulletin of Entomological Research **95**:417-427.

14. Cividanes, F. J., and J. C. Barbosa. 2001. Effects of no-tillage and of soybean-corn intercropping on natural enemies and pests. Pesquisa Agropecuaria Brasileira **36**:235-241.
15. Colley, M. R., and J. M. Luna. 2000. Relative attractiveness of potential beneficial insectary plants to aphidophagous hoverflies (Diptera : Syrphidae). Environmental Entomology **29**:1054-1059.
16. den Belder, E., J. Elderson, and P. F. G. Vereijken. 2000. Effects of undersown clover on host-plant selection by *Thrips tabaci* adults in leek. Entomologia Experimentalis et Applicata **94**:173-182.
17. Duale, A. H., and K. F. Nwanze. 1999. Incidence and distribution in sorghum of the spotted stem borer *Chilo partellus* and associated natural enemies in farmers' fields in Andhra Pradesh and Maharashtra states. International Journal of Pest Management **45**:3-7.
18. English-Loeb, G., M. Rhainds, T. Martinson, and T. Ugine. 2003. Influence of flowering cover crops on *Anagrus* parasitoids (Hymenoptera : Mymaridae) and *Erythroneura* leafhoppers (Homoptera : Cicadellidae) in New York vineyards. Agricultural and Forest Entomology **5**:173-181.
19. Fitzgerald, J. D., and M. G. Solomon. 2004. Can flowering plants enhance numbers of beneficial arthropods in UK apple and pear orchards? Biocontrol Science and Technology **14**:291-300.

20. Frere, I., J. Fabry, and T. Hance. 2007. Apparent competition or apparent mutualism? An analysis of the influence of rose bush strip management on aphid population in wheat field. Journal of Applied Entomology **131**:275-283.
21. Gao, F., F. Ge, X. Liu, and Y. Song. 2008. Impact of insecticides on the structure and productivity of insect pest and natural enemy communities associated with intercropping in cotton agroecosystems. International Journal of Pest Management **54**:103-114.
22. Gianoli, E., I. Ramos, A. Alfaro-Tapia, Y. Valdez, E. R. Echegaray, and E. Yabar. 2006. Benefits of a maize-bean-weeds mixed cropping system in Urubamba Valley, Peruvian Andes. International Journal of Pest Management **52**:283-289.
23. Girma, H., M. R. Rao, and S. Sithanantham. 2000. Insect pests and beneficial arthropods population under different hedgerow intercropping systems in semiarid Kenya. Agroforestry Systems **50**:279-292.
24. Guvenc, I. N., and E. Yildirim. 2006. Increasing productivity with intercropping systems in cabbage production. Journal of Sustainable Agriculture **28**:29-44.
25. Hanna, R., F. G. Zalom, and W. J. Roltsch. 2003. Relative impact of spider predation and cover crop on population dynamics of *Erythroneura variabilis* in a raisin grape vineyard. Entomologia Experimentalis et Applicata **107**:177-191.
26. Harvey, C. T., and M. D. Eubanks. 2004. Effect of habitat complexity on biological control by the red imported fire ant (Hymenoptera : Formicidae) in collards. Biological Control **29**:348-358.
27. Hooks, C. R. R., and M. W. Johnson. 2004. Using undersown clovers as living mulches: effects on yields, lepidopterous pest infestations, and spider densities in

a Hawaiian broccoli agroecosystem. International Journal of Pest Management **50**:115-120.

28. Hooks, C. R. R., and M. W. Johnson. 2006. Population densities of herbivorous lepidopterans in diverse cruciferous cropping habitats: Effects of mixed cropping and using a living mulch. Biocontrol **51**:485-506.
29. Jones, G. A., and J. L. Gillett. 2005. Intercropping with sunflowers to attract beneficial insects in organic agriculture. Florida Entomologist **88**:91-96.
30. Jones, G. A., and K. E. Sieving. 2006. Intercropping sunflower in organic vegetables to augment bird predators of arthropods. Agriculture Ecosystems & Environment **117**:171-177.
31. Kamunya, S. M., F. N. Wachira, J. Lang'at, W. Otieno, and V. Sudoi. 2008. Integrated management of root knot nematode (*Meloidogyne* spp.) in tea (*Camellia sinensis*) in Kenya. International Journal of Pest Management **54**:129-136.
32. Khan, Z. R., J. A. Pickett, L. J. Wadhams, A. Hassanali, and C. A. O. Midega. 2006. Combined control of *Striga hermonthica* and stemborers by maize-*Desmodium* spp. intercrops. Crop Protection **25**:989-995.
33. Khan, Z. R., C. A. O. Midega, A. Hassanali, J. A. Pickett, L. J. Wadhams, and A. Wanjoya. 2006. Management of witchweed, *Striga hermonthica*, and stemborers in sorghum, *Sorghum bicolor*, through intercropping with greenleaf desmodium, *Desmodium intortum*. International Journal of Pest Management **52**:297-302.
34. Khan, Z. R., C. A. O. Midega, D. M. Amudavi, A. Hassanali, and J. A. Pickett. 2008. On-farm evaluation of the 'push-pull' technology for the control of

stemborers and striga weed on maize in western Kenya. Field Crops Research **106**:224-233.

35. Lale, N. E. S., and B. M. Sastawa. 2000. Evaluation of host plant resistance, sowing date modification and intercropping as methods for the control of *Mylabris* and *Coryna* species (Coleoptera : Meloidae) infesting pearl millet in the Nigerian Sudan savanna. Journal of Arid Environments **46**:263-280.
36. LaMondia, J. A., W. H. Elmer, T. L. Mervosh, and R. S. Cowles. 2002. Integrated management of strawberry pests by rotation and intercropping. Crop Protection **21**:837-846.
37. Lee, J. C. and G. E. Heimpel. 2005. Impact of flowering buckwheat on lepidopteran cabbage pests and their parasitoids at two spatial scales. Biological control **34**:290-301.
38. McIntyre, B. D., C. S. Gold, I. N. Kashaija, H. Ssali, G. Night, and D. P. Bwamiki. 2001. Effects of legume intercrops on soil-borne pests, biomass, nutrients and soil water in banana. Biology and Fertility of Soils **34**:342-348.
39. Midega, C. A. O., Z. R. Khan, J. Van den Berg, C. Ogol, J. A. Pickett, and L. J. Wadhams. 2006. Maize stemborer predator activity under 'push-pull' system and Bt-maize: A potential component in managing Bt resistance. International Journal of Pest Management **52**:1-10.
40. Midega, C. A. O., Z. R. Khan, J. van den Berg, C. Ogol, A. S. Dippenaar-Schoeman, J. A. Pickett, and L. J. Wadhams. 2008. Response of ground-dwelling arthropods to a 'push-pull' habitat management system: spiders as an indicator group. Journal of Applied Entomology **132**:248-254.

41. Nabirye, J., P. Nampala, M. W. Ogenga-Latigo, S. Kyamanywa, H. Wilson, V. Odeke, C. Iceduna, and E. Adipala. 2003. Farmer-participatory evaluation of cowpea integrated pest management (IPM) technologies in Eastern Uganda. Crop Protection **22**:31-38.
42. Ndemah, R., F. Schulthess, S. Korie, C. Borgemeister, H. M. Poehling, and K. Cardwell. 2003. Factors affecting infestations of the stalk borer *Busseola fusca* (Lepitoptera : Noctuidae) on maize in the forest zone of Cameroon with special reference to scelionid egg parasitoids. Environmental Entomology **32**:51-60.
43. Ngeve, J. M. 2003. The cassava root mealybug (*Stictococcus vayssierei* Richard) (Homoptera : Stictococcidae): a threat to cassava production and utilization in Cameroon. International Journal of Pest Management **49**:327-333.
44. Ogol, C., J. R. Spence, and A. Keddie. 1999. Maize stem borer colonization, establishment and crop damage levels in a maize-leucaena agroforestry system in Kenya. Agriculture Ecosystems & Environment **76**:1-15.
45. Parajulee, M. N., and J. E. Slosser. 1999. Evaluation of potential relay strip crops for predator enhancement in Texas cotton. International Journal of Pest Management **45**:275-286.
46. Perfecto, I., J. H. Vandermeer, G. L. Bautista, G. I. Nunez, R. Greenberg, P. Bichier, and S. Langridge. 2004. Greater predation in shaded coffee farms: The role of resident neotropical birds. Ecology **85**:2677-2681.
47. Pitan, O. O. R., and G. O. Olatunde. 2006. Effects of intercropping tomato (*Lycopersicon esculentum*) at different times with cowpea (*Vigna unguiculata*) or

okra (*Abelmoschus esculentus*) on crop damage by major insect pests. Journal of Agricultural Science **144**:361-368.

48. Pontin, D. R., M. R. Wade, P. Kehrli, and S. D. Wratten. 2006. Attractiveness of single and multiple species flower patches to beneficial insects in agroecosystems. Annals of Applied Biology **148**:39-47.
49. Rao, M. R., and M. N. Mathuva. 2000. Legumes for improving maize yields and income in semi-arid Kenya. Agriculture Ecosystems & Environment **78**:123-137.
50. Rukazambuga, N., C. S. Gold, S. R. Gowen, and P. Ragama. 2002. The influence of crop management on banana weevil, *Cosmopolites sordidus* (Coleoptera : Curculionidae) populations and yield of highland cooking banana (cv. Atwalira) in Uganda. Bulletin of Entomological Research **92**:413-421.
51. Sastawa, B. M., M. Lawan, and Y. T. Maina. 2004. Management of insect pests of soybean: effects of sowing date and intercropping on damage and grain yield in the Nigerian Sudan savanna. Crop Protection **23**:155-161.
52. Schader, C., J. G. Zaller, and U. Kopke. 2005. Cotton-basil intercropping: Effects on pests, yields and economical parameters in an organic field in Fayoum, Egypt. Biological Agriculture & Horticulture **23**:59-72.
53. Schulthess, F., A. Chabi-Olaye, and S. Gounou. 2004. Multi-trophic level interactions in a cassava-maize mixed cropping system in the humid tropics of West Africa. Bulletin of Entomological Research **94**:261-272.
54. Sekamatte, B. M., M. Ogenga-Latigo, and A. Russell-Smith. 2003. Effects of maize-legume intercrops on termite damage to maize, activity of predatory ants and maize yields in Uganda. Crop Protection **22**:87-93.

55. Showler, A. T., and S. M. Greenberg. 2003. Effects of weeds on selected arthropod herbivore and natural enemy populations, and on cotton growth and yield. Environmental Entomology **32**:39-50.
56. Skelton, L. E., and G. W. Barrett. 2005. A comparison of conventional and alternative agroecosystems using alfalfa (*Medicago sativa*) and winter wheat (*Triticum aestivum*). Renewable Agriculture and Food Systems **20**:38-47.
57. Smith, H. A., and R. McSorley. 2000. Potential of field corn as a barrier crop and eggplant as a trap crop for management of *Bemisia argentifolii* (Homoptera : Aleyrodidae) on common bean in North Florida. Florida Entomologist **83**:145-158.
58. Smith, H. A., R. McSorley, and J. A. S. Izaguirre. 2001. Effect of intercropping common bean with poor hosts and nonhosts on numbers of immature whiteflies (Homoptera : Aleyrodidae) in the Salama Valley, Guatemala. Environmental Entomology **30**:89-100.
59. Smith, H. A., R. L. Koenig, H. J. McAuslane, and R. McSorley. 2000. Effect of silver reflective mulch and a summer squash trap crop on densities of immature *Bemisia argentifolii* (Homoptera : Aleyrodidae) on organic bean. Journal of Economic Entomology **93**:726-731.
60. Songa, J. M., N. Jiang, F. Schulthess, and C. Omwega. 2007. The role of intercropping different cereal species in controlling lepidopteran stemborers on maize in Kenya. Journal of Applied Entomology **131**:40-49.

61. Sperber, C. F., K. Nakayama, M. J. Valverde, and F. D. Neves. 2004. Tree species richness and density affect parasitoid diversity in cacao agroforestry. Basic and Applied Ecology **5**:241-251.

62. Wale, M., F. Schulthess, E. W. Kairu, and C. O. Omwega. 2007. Effect of cropping systems on cereal stemborers in the cool-wet and semi-arid ecozones of the Amhara region of Ethiopia. Agricultural and Forest Entomology **9**:73-84.

Appendix 2. Salquero-Rivera method for calculating a grand standard deviation for a series of measurements each of which has an associated standard error or standard deviation.

Population Mean and Standard deviation:

We have n samples each with mean value, standard error and sample size.

So

Sample 1: $\bar{X}_1 , SE_1 , n_1$

Sample 2: $\bar{X}_2 , SE_2 , n_2$

⋮

Sample n: $\bar{X}_n , SE_n , n_n$

Where $N = n_1 + n_2 + \cdots n_n$

Equation (1) relates standard error with standard deviation and sample size n

$$SE = \frac{SD}{\sqrt{n}} \qquad (1)$$

If we square equation (1), we get equation (2)

$$(SE)^2 = \frac{(SD)^2}{n} \qquad (2)$$

Furthermore, variance for any sample is defined by equation (3)

$$(SD)^2 = \frac{\sum\left(x_i - \bar{X}\right)^2}{(n-1)} \qquad (3)$$

Replacing (3) en (2) we have:

$$(SE)^2\ (n-1)(n) = \sum\left(x_i - \bar{X}\right)^2 \qquad (4)$$

And

$$\sum\left(x_i - \bar{X}\right)^2 = \sum(x_i)^2 - n\bar{X}^2 \qquad (5)$$

Replacing (5) in (4), we get

$$(SE)^2\ (n-1)(n) = \sum(x_i)^2 - n\bar{x}^2 \qquad (6)$$

Therefore

$$\sum (x_i)^2 = (SE)^2 (n-1)(n) + n \bar{x}^2 \qquad (7)$$

Equation (7) is applied for each sample n

Then, we have for population variance the equation (8)

$$(SD)^2 = \frac{\sum \left(x_i - \bar{x} \right)^2}{(n_1 + n_2 + \ldots + n_n)} \qquad (8)$$

By equation (6), we get population variance in terms of sampling data

$$(SD)^2 = \frac{\sum (x_i)^2 - (n_1 + n_2 + \cdots + n_n) \bar{x}^2}{(n_1 + n_2 + \cdots n_n)} \qquad (9)$$

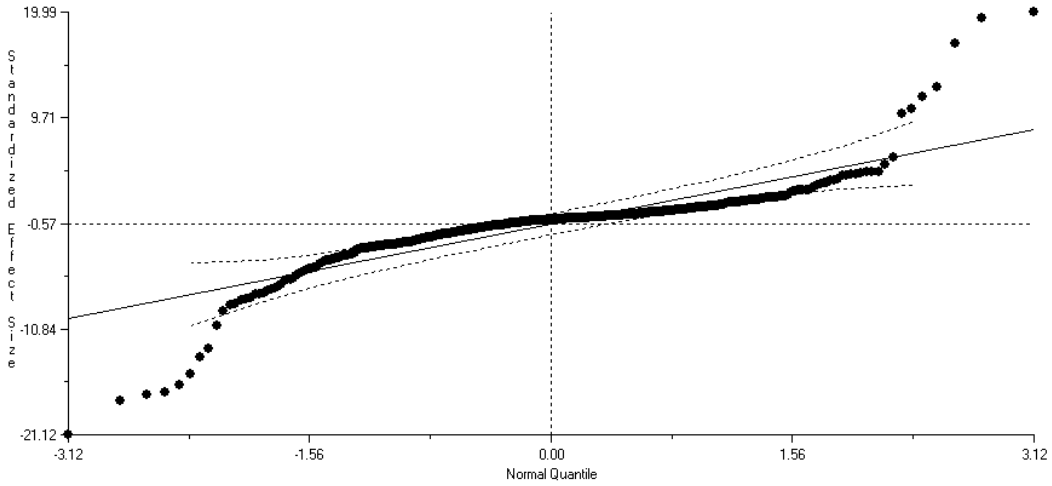
Where

$$\bar{x} = \frac{n_1 \bar{x}_1 + n_2 \bar{x}_2 + \cdots + n_n \bar{x}_n}{(n_1 + n_2 + \cdots n_n)} \qquad (10)$$

and

$$\sum x_i)^2 = \sum x_{i1})^2 + \sum x_{i2})^2 + \ldots + \sum x_{in})^2 \qquad (11)$$

Appendix 3. Normal plot of Hedge's *d* values.



Appendix 4. We used mean Hedge's *d* values for the experiments that coincided (indicated in bold type) with those presented in Table 1 of Poveda et al. (2008): herbivores by species, natural enemies or mortality by natural enemies, and yield, including crop damage. Mean Hedge´s *d* values from the 45 articles ranged from -9.06 to 2.37, with only two zero values. Because taking various "near-zero" values as zero did not radically change the overall level of agreement with the outcome counts of Poveda et al. (2008) we simply used an absolute zero value as zero as did Halaj and Wise (2001). Whereas Poveda et al. (2008) reported contradictory effects with a question mark because test outcomes were sometimes significantly positive and other times significantly negative, in our analysis, a mean Hedge's *d* value was calculated for all tests (+, -, o). However, if the values making up the mean were noticeably negative and positive and the mean value close to zero, then we considered our value in agreement with a mixed outcome (designated as "?"). Finally, to arrive at direct estimate of how much of the time our analysis components were in agreement, we summed the proportion of coincident outcomes per study in the articles included in both reviews (listed in Appendix 4).

	Counts – Poveda et al. 2008			**Mean of Hedge's *d*-values – Meta-analysis**			**Proportion**
Article Number	**Herbivore**	**Enemy**	**Yield**	**Herbivore**	**Enemy**	**Yield**	**in Common**
2	-			**-2.11**			1
4		o			-0.16		0

5		o		0.00			0
6		+			**2.63**		1
7	-			**-1.65**			1
8	-,+	-.o	-	[**-0.24**][-0.23]			0.5
11	-	+		**-0.25**	**0.38**		1
12	?	+		**-1.86**			1
14	?,+	?.+		**0.32**	**0.92**		1
16	-			**-1.57**			1
17	-			**-2.56**			1
18	o	?		-0.02	**0.08**		0.5
19	?	+	o	**0.33**			1
20	o	o		0.17	-0.06		0
21	-,o	+				-1.09	0
22	-,o	o	o	[**-10.46**][-34.61]	-0.07	-0.42	0.5
25	o	+.o		0.05	[**0.80**][0.35]		0.33
26	-	-.+	-	**-0.72**			1
27	-	?		0.02	**-0.50**		0.5
28	?	?.o		-2.88	0.00		1
29	+	+		-0.18	**1.76**		0.5
32	+			-12.77			0

33			+	-1.49			0
34			+	-3.60		**3.08**	1
36	?			**0.66**			1
37	o	?.+.o			[**0.27**][**0.72**][13]		0.66
39	-	+		**-0.49**	**0.99**		1
40		+.o			[**26.89**][0.52]		0.5
44	-		+	**-0.44**			1
45	+,o	o	?	[**2,16**][-2,21]	1.09		0.33
46		+		-1.31			0
48		+			**1.53**		1
50	-		+	**-1.20**			1
51	-		-	**-9.06**			1
52	-	+	o	**-1.28**			1
53	-	+	o	**-2.78**	**1.52**	-3.48	0.66
54	-	+	+	**-4.50**	**14.95**	**1.59**	1
55	-	+	-	2.37	**0.30**		0.5
56	?	?	?	**-0.35**	**0.19**	**-2.82**	1
57	o			-0.40	-0.21		0
58	o			-0.46			0
59	o			-0.47			0

60	-	+	+	**-2.46**	**0.27**	-1.99	0.66
61		?			**0.90**		1
62	-		-	**-0.61**	-0.05	**-0.33**	1
62	+		-	-0.90			0
						%	
						Agreement	41

Literature cited

Halaj, J., and D. H. Wise. 2001. Terrestrial trophic cascades: How much do they trickle? American Naturalist **157**:262-281.

Poveda, K., M. I. Gomez, and E. Martinez. 2008. Diversification practices: their effect on pest regulation and production. Revista Colombiana De Entomologia **34**:131-144.