

Supplementary Table and Figures

Table S1. Nontarget arthropods of cotton field for primers species-specific detection.

Order	Family	Species
		<i>Hippodamia variegata</i> (Goeze)
Coleoptera	Coccinellidae	<i>Coccinella undecimpunctata</i> Linnaeus
		<i>Stethorus punctillum</i> Weise
Diptera	Syrphidae	<i>Eupeodes corollae</i> (Fabricius)
		<i>Episyrphus balteatus</i> (De Geer)
Hymenoptera	Braconidae	<i>Binodoxys communis</i> (Gahan)
Neuroptera	Chrysopidae	<i>Chrysoperla sinica</i> (Tjeder)
		<i>Deraeocoris punctulatus</i> (Fallen)
Hemiptera	Miridae	<i>Campylomma verbasci</i> (Meyer-Dür)
		<i>Adelphocoris lineolatus</i> (Goeze)
		<i>Lygus pratensis</i> (Linnaeus)
		<i>Helicoverpa armigera</i> (Hübner)
		<i>Spodoptera exigua</i> (Hübner)
Lepidoptera	Noctuidae	<i>Agrotis segetum</i> (Denis & Schiffermüller)
		<i>Agrotis c-nigrum</i> (Linnaeus)
		<i>Agrotis exclamationis</i> (Linnaeus)
Thysanoptera	Thripidae	<i>Frankliniella intonsa</i> (Trybom)
Acari	Tetranychidae	<i>Tetranychus urticae</i> Koch
		<i>Tetranychus turkestani</i> (Ugarov & Nikolskii)

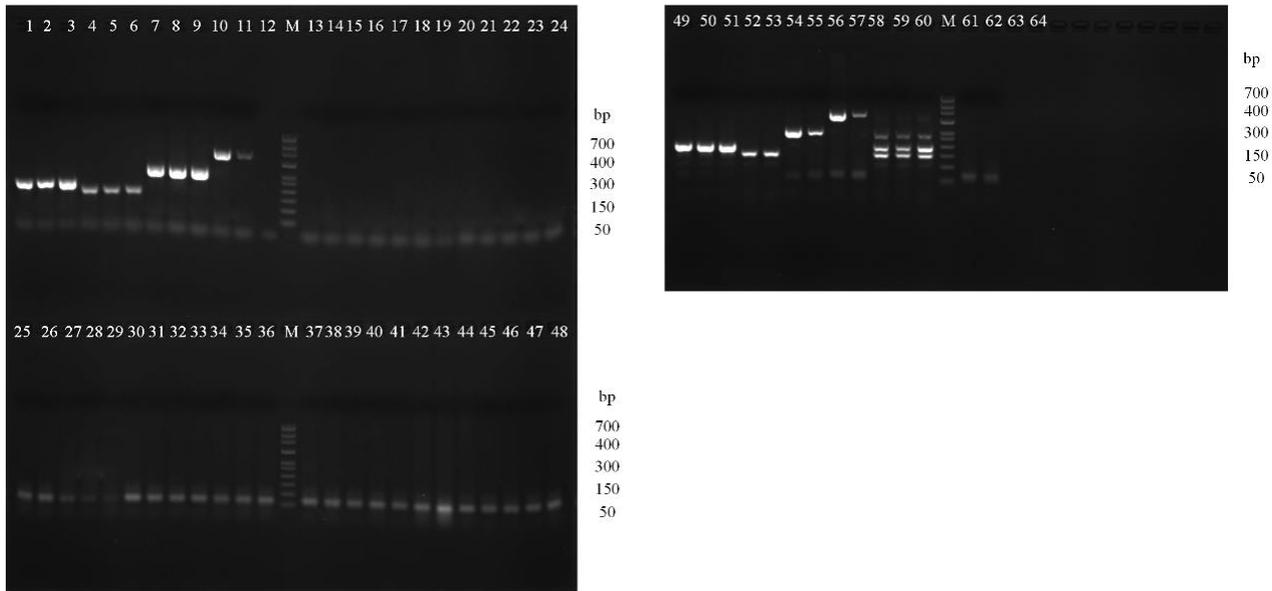


Figure S1. Specificity and efficacy of multiplex PCR system MP1 for aphid detection. 1-3: *Aphis gossypii* Glover, 4-6: *Acyrtosiphon gossypii* Mordvilko, 7-9: *Aphis craccivora* Koch, 10-11: *Myzus persicae* (Sulzer), 12-14: ddH₂O, 15-16: *Hippodamia variegata* (Goeze), 17-18: *Coccinella undecimpunctata* Linnaeus, 19-20: *Stethorus punctillum* Weise, 21-22: *Syrphus corollae* (Fabricius), 23-24: *Episyrphus balteatus* (De Geer), 25-26: *Campylomma verbasci* (Meyer-Dur), 27-28: *Chrysoperla sinica* (Tjeder), 29-30: *Lygus pratensis* (Linnaeus), 31-32: *Adelphocoris lineolatus* (Goeze), 33-34: *Helicoverpa armigera* (Hübner), 35-36: *Spodoptera exigua* (Hübner), 37-38: *Agrotis segetum* (Denis & Schiffermüller), 39-40: *Agrotis c-nigrum* (Linnaeus), 41-42: *Agrotis exclamationis* (Linnaeus), 43-44: *Frankliniella intonsa* (Trybom), 45-46: *Tetranychus turkestanii* (Ugarov & Nikolskii), 47-48: *Episyrphus balteatus* (De Geer), 49-51: *Aphis gossypii* Glover, 52-53: *Acyrtosiphon gossypii* Mordvilko, 54-55: *Aphis craccivora* Koch, 56-57: *Myzus persicae* (Sulzer), 58-60: DNA mix of the four aphids species, 61-62: ddH₂O.

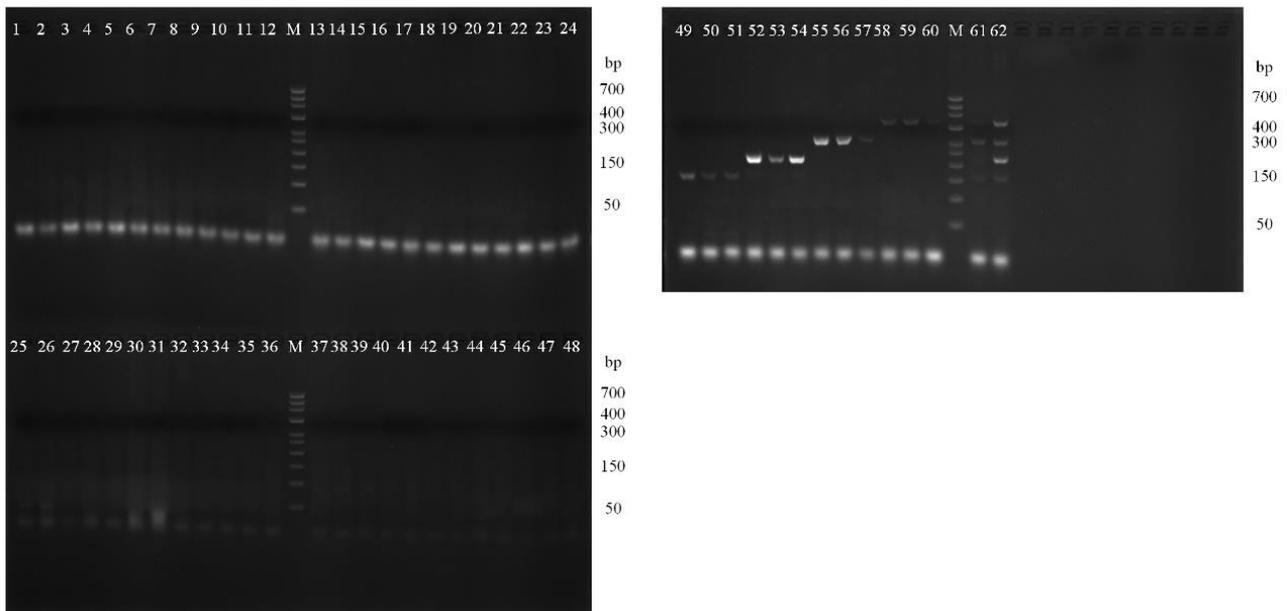


Figure S2. Specificity and efficacy of multiplex PCR system MP2 for primary parasitoids detection. 1-3: *Aphis gossypii* Glover, 4-6: *Acyrtosiphon gossypii* Mordvilko, 7-9: *Aphis craccivora* Koch, 10-11: *Myzus persicae* (Sulzer), 12-14: ddH₂O, 15-16: *Hippodamia variegata* (Goeze), 17-18: *Coccinella undecimpunctata* Linnaeus, 19-20: *Stethorus punctillum* Weise, 21-22: *Syrphus corollae* (Fabricius), 23-24: *Episyrphus balteatus* (De Geer), 25-26: *Campylomma verbasci* (Meyer-Dur), 27-28: *Chrysoperla sinica* (Tjeder), 29-30: *Lygus pratensis* (Linnaeus), 31-32: *Adelphocoris lineolatus* (Goeze), 33-34: *Helicoverpa armigera* (Hübner), 35-36: *Spodoptera exigua* (Hübner), 37-38: *Agrotis segetum* (Denis & Schiffermüller), 39-40: *Agrotis c-nigrum* (Linnaeus), 41-42: *Agrotis exclamationis* (Linnaeus), 43-44: *Frankliniella intonsa* (Trybom), 45-46: *Tetranychus turkestanii* (Ugarov & Nikolskii), 47-48: *Episyrphus balteatus* (De Geer), 49-51: *Praon barbatum* Mackauer, 52-54: *Binodoxys communis* (Gahan), 55-57: *Lysiphlebus fabarum* (Marshall), 58-60: *Trioxys asiaticus* Telenga, 61-62: DNA mix of the four primary parasitoids.

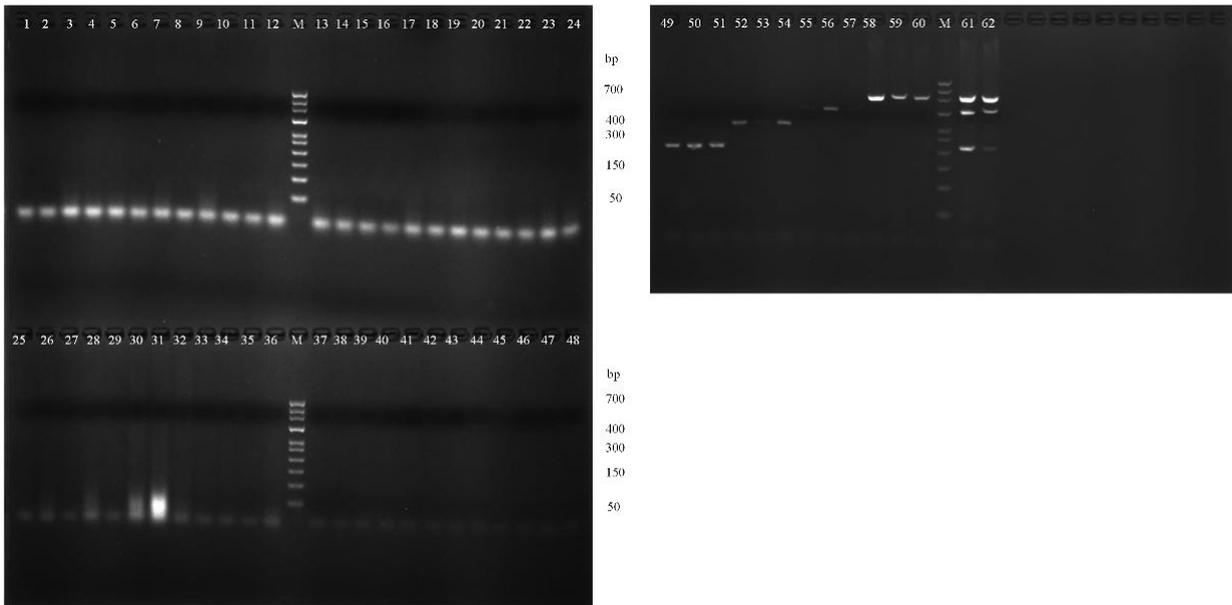


Figure S3. Specificity and efficacy of multiplex PCR system MP3 for hyperparasitoid detection. 1-3: *Aphis gossypii* Glover, 4-6: *Acyrtosiphon gossypii* Mordvilko, 7-9: *Aphis craccivora* Koch, 10-11: *Myzus persicae* (Sulzer), 12-14: ddH₂O, 15-16: *Hippodamia variegata* (Goeze), 17-18: *Coccinella undecimpunctata* Linnaeus, 19-20: *Stethorus punctillum* Weise, 21-22: *Syrphus corollae* (Fabricius), 23-24: *Episyrphus balteatus* (De Geer), 25-26: *Campylomma verbasci* (Meyer-Dur), 27-28: *Chrysoperla sinica* (Tjeder), 29-30: *Lygus pratensis* (Linnaeus), 31-32: *Adelphocoris lineolatus* (Goeze), 33-34: *Helicoverpa armigera* (Hübner), 35-36: *Spodoptera exigua* (Hübner), 37-38: *Agrotis segetum* (Denis & Schiffermüller), 39-40: *Agrotis c-nigrum* (Linnaeus), 41-42: *Agrotis exclamationis* (Linnaeus), 43-44: *Frankliniella intonsa* (Trybom), 45-46: *Tetranychus turkestanii* (Ugarov & Nikolskii), 47-48: *Episyrphus balteatus* (De Geer), 49-51: *Pachyneuron aphidi* (Bouché), 52-54: *Alloxysta* sp., 55-57: *Syrphophagus* spp., 58-60: *Dendrocerus laticeps* (Hedicke), 61-62: DNA mix of the four hyperparasitoid.

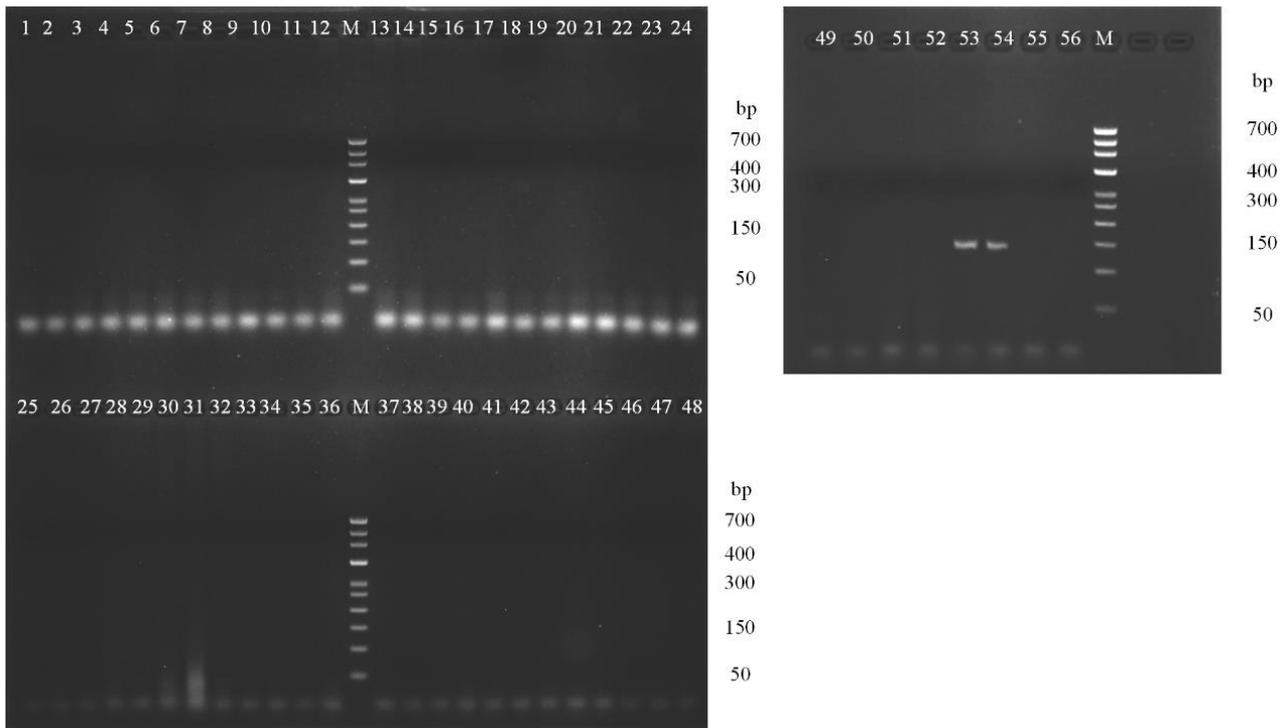


Figure S4. Specificity and efficacy of multiplex PCR system SP1 for hyperparasitoid detection. 1-3: *Aphis gossypii* Glover, 4-6: *Acyrtosiphon gossypii* Mordvilko, 7-9: *Aphis craccivora* Koch, 10-11: *Myzus persicae* (Sulzer), 12-14: ddH₂O, 15-16: *Hippodamia variegata* (Goeze), 17-18: *Coccinella undecimpunctata* Linnaeus, 19-20: *Stethorus punctillum* Weise, 21-22: *Syrphus corollae* (Fabricius), 23-24: *Episyrphus balteatus* (De Geer), 25-26: *Campylomma verbasci* (Meyer-Dur), 27-28: *Chrysoperla sinica* (Tjeder), 29-30: *Lygus pratensis* (Linnaeus), 31-32: *Adelphocoris lineolatus* (Goeze), 33-34: *Helicoverpa armigera* (Hübner), 35-36: *Spodoptera exigua* (Hübner), 37-38: *Agrotis segetum* (Denis & Schiffermüller), 39-40: *Agrotis c-nigrum* (Linnaeus), 41-42: *Agrotis exclamationis* (Linnaeus), 43-44: *Frankliniella intonsa* (Trybom), 45-46: *Tetranychus turkestanii* (Ugarov & Nikolskii), 47-48: *Episyrphus balteatus* (De Geer), 49-52: *Hippodamia variegata* (Goeze), 53-54: *Asaphes suspensus* (Nees). 55-56: ddH₂O.