

Supplementary Materials:

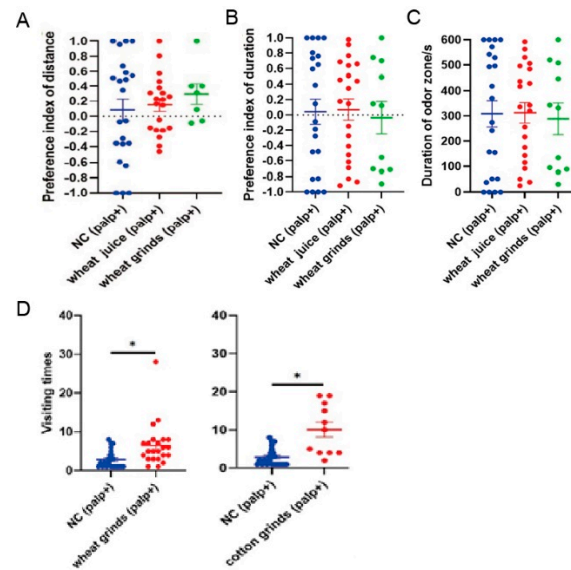


Figure S1. Characterization of novel DER behavioral assay. A: Preference index defined with total moving distance of locusts to single stimulation of NC, wheat juice or wheat grinds, respectively. Palp+: antennae-ablated locusts. One-way ANOVA with Fisher's LSD multiple comparisons test, n=7-22. B: Preference index defined with total moving duration of locusts to single stimulation of NC, wheat juice or wheat grinds, respectively. One-way ANOVA with Fisher's LSD multiple comparisons test, n=11-22. C: Total moving duration of locusts in each odor zones containing NC, wheat juice and wheat grinds. One-way ANOVA with Fisher's LSD multiple comparisons test, n=11-22. D: Total visiting times of locusts in each zone of two-choice assay between NC and wheat grinds, or between NC and cotton grinds. Unpaired t-test, n=11-23. * p<0.05.

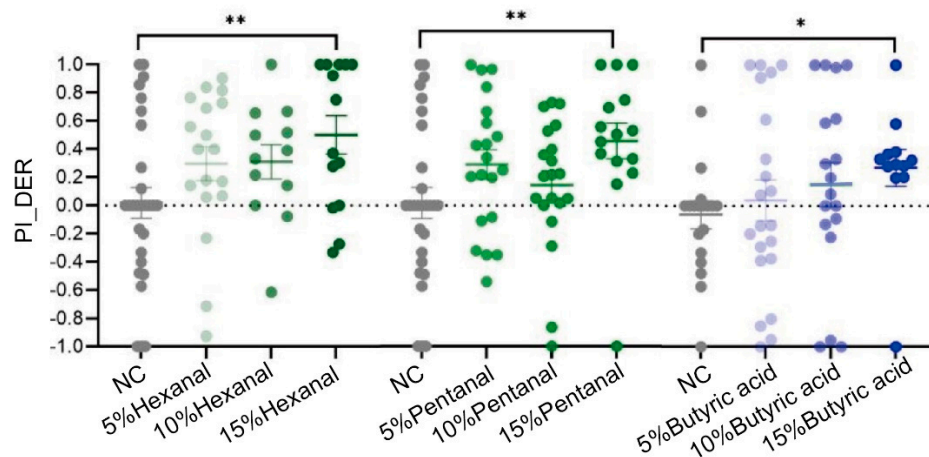


Figure S2. Dose-dependent behavioral curve of three plant volatiles. Three doses (5%, 10% and 15%, v/v) were tested. One-way ANOVA with Fisher's LSD multiple comparisons test, n=12-22. Error bars indicate SEM. * p<0.05 and ** p<0.01.

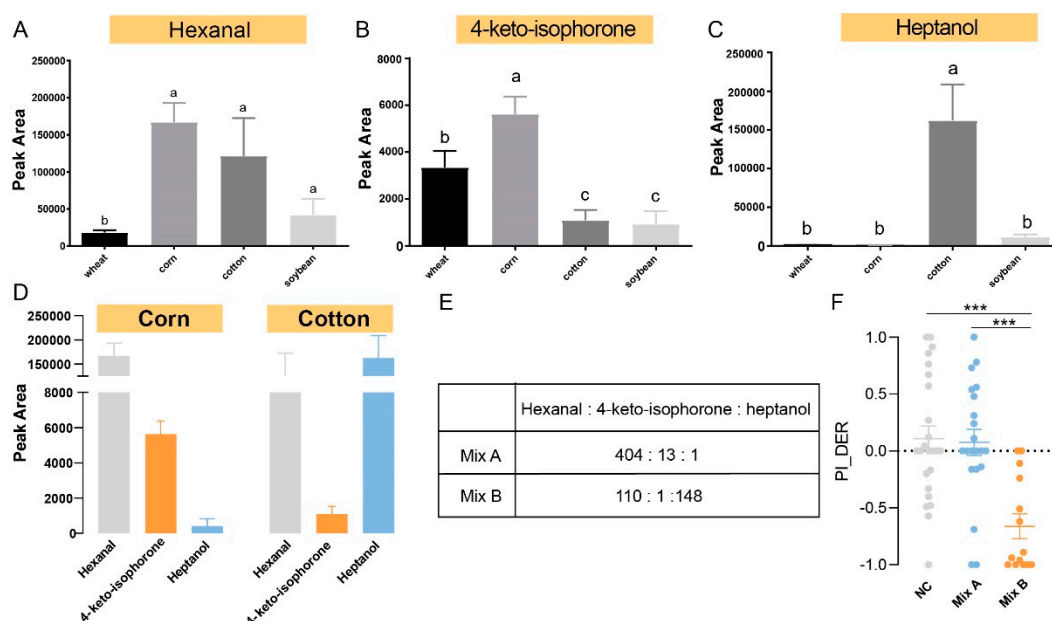


Figure S3. Quantification of plant volatiles by GC-MS. A-C: Peak area of hexanal (A), 4-keto-isophorone (B) and heptanol (C) released from host and non-host plants. One-way ANOVA followed by post hoc analysis with Fisher's LSD test. Error bars stands for SEM and n=4 for each chemical. D: Comparison of chemical quantity in corn and cotton. E: Mixtures prepared based on the natural ratio indicated in (D), as indicated with corn (Mix A) and cotton (Mix B). N=4 for each plants. F: PI_DER of locusts to mixed compounds (15%, v/v). One-way ANOVA followed by post hoc analysis with Fisher's LSD test, n=14-24. *** p<0.001.

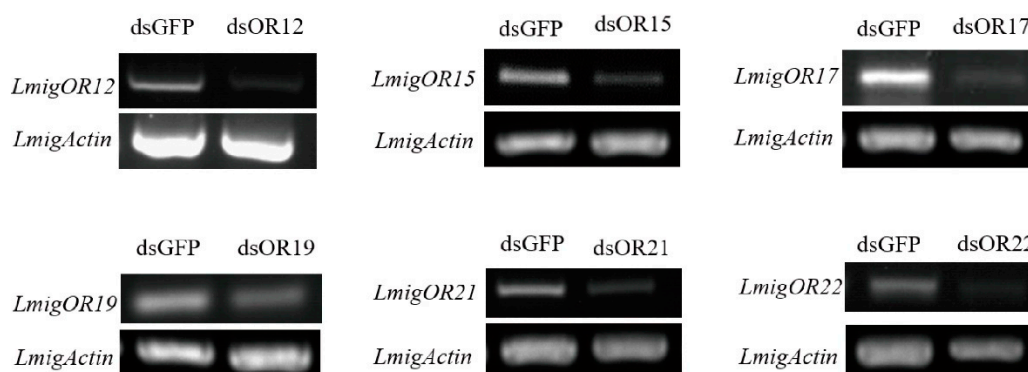


Figure S4. RNAi efficiency determined with RT-PCR.

Table S1. Details of odors used in the behavioral assays

No.	Source	Volatiles	CAS No.	Solvent	Purity
1	Common	Hexanal	66-25-1	paraffin oil	99%
2	Common	E-2-hexenal	6728-26-3	paraffin oil	99%
3	Common	Pentanal	110-62-3	paraffin oil	97%
4	Host specific	E-2-Pentenal	1576-87-0	paraffin oil	99%
5	Host specific	2-methyl-2-pentenal	623-36-9	paraffin oil	97%
6	Host specific	4-keto-isophorone	1125-21-9	paraffin oil	99%
7	Non-host specific	Heptanal	111-70-6	paraffin oil	99.5%
8	Non-host specific	Heptanol	111-71-7	paraffin oil	95%
9	Non-host specific	2-octnone	111-13-7	paraffin oil	98%
10	—	Butyric acid	107-92-6	paraffin oil	99%

Table S2. Primers used for RT-PCR and the Tm

OR	Accession number	Forward primer	Reverse primer	Tm
<i>Lmig</i> OR12	KP843312.1	ATAGAAAACCAGCGAAAGCAA	ACAATATTCGTGCCTTCGTT	57.1°C
<i>Lmig</i> OR15	KP843258.1	GTCCAGATACCGCTGACGACT	TCGCTCTGGTTGATGACCCTC	59.1°C
<i>Lmig</i> OR17	KP843365.1	TCTACCTCTTCAGCACCGAC	CCACACCAGCAGTAGAGGAA	60°C
<i>Lmig</i> OR19	KP843237.1	GTCCATACGGTCTGTTCACCA	CCAGCATGTAATACTTCGGCTT	57.4°C
<i>Lmig</i> OR21	KP843321.1	ACCTCTCGCTGTACGTGTC	GTTCGTGCCCCGCCATAGCAAT	57.1°C
<i>Lmig</i> OR22	KP843252.1	TGGTTCCCGTTCGACCCAGT	GCCAGTGTCCCAAAGTCGCTCT	59.1°C

Table S3. Sequence of primers used in RNAi experiments

Primer	Sequence (Red indicates T7 promoter sequence)
GFP-F	GGATCCTAATACGACTCACTATAGGCACAAGTTCAGCGTGTCCG
GFP-R	GGATCCTAATACGACTCACTATAGGGTTCACCTTGATGCCGTTC
T7- <i>Lmig</i> OR12-F	GGATCCTAATACGACTCACTATAGGCAGAGCGACTTCAAACC
T7- <i>Lmig</i> OR12-R	GGATCCTAATACGACTCACTATAGGGCAAGGCTACACTCAAATAC
T7- <i>Lmig</i> OR15-F	GGATCCTAATACGACTCACTATAGGCGTGCTCAACGACAACCTG
T7- <i>Lmig</i> OR15-R	GGATCCTAATACGACTCACTATAGGAGTGGCGATGACTTGAAAC
T7- <i>Lmig</i> OR17-F	GGATCCTAATACGACTCACTATAGGTCTACCTCTTCAGCACCGAC
T7- <i>Lmig</i> OR17-R	GGATCCTAATACGACTCACTATAGGCCACACCAGCAGTAGAGGAA
T7- <i>Lmig</i> OR19-F	GGATCCTAATACGACTCACTATAGGATTATGGACCACCAGGAA
T7- <i>Lmig</i> OR19-R	GGATCCTAATACGACTCACTATAGGGTAGGAGTAAGAAGCGTTG
T7- <i>Lmig</i> OR21-F	GGATCCTAATACGACTCACTATAGGTGGTTCCCGTTCGACCCAGT
T7- <i>Lmig</i> OR21-R	GGATCCTAATACGACTCACTATAGGGCCAGTGTCCCAAAGTCGCTCT
T7- <i>Lmig</i> OR22-F	GGATCCTAATACGACTCACTATAGGGACGGCGGTGAAATGGTG
T7- <i>Lmig</i> OR22-R	GGATCCTAATACGACTCACTATAGGGGCGGAGTAAAGCGTAGAATG