

**Table S1.** Samples of litchi and longan orchards.

County	Orchard names	Location	Orchard types
Longmen	Feifang cooperative	Gankeng Village et al., Longjiang Town	Longan
	Bainian litchi orchard		Litchi and longan
	Lizhishengtaiyuan orchard	Niuwei Village, Pingling Town	Litchi and longan
Boluo	Haiying cooperative	Jinziling Village, Luoyang Town	Litchi and longan
	Lichunying litchi orchard	Meihua Village, Luoyang Town	Litchi
	Dongpo litchi orchard	Shanqian Village, Longhua Town	Litchi
	Shanqian cooperative	Liucun Village, Longhua Town	Litchi
	Anduo orchard	Liantang Village, Huzhen Town	Litchi and longan
	Litchi Longan Science and Technology Demonstration Park	Xiacun Village, Huzhen Town	Litchi
	Leigongxiangshan cooperative	Leigong Village, Taimei Town	Litchi
	Liantang cooperative	Wutang Village, Guanying Town	Litchi
	Gushu litchi orchard	Nanxi Village, Xikou Village and Jiezi Village, Gongzhuang Town	Litchi and longan
	Huihuang cooperative	Nanxi Village, Gongzhuang Town	Litchi and longan
Huicheng	Xikeng orchard	Huihuan Avenue	Litchi and longan
	Dayaochi orchard	Huangdong Village, Huizhou West Railway Station	Litchi and longan
	Linong cooperative	Lilin Town, Zhongkai High-tech Zone	Litchi
	Fenghua orchard	Dongjiang Village, Chenjiang Street	Litchi and longan
Huiyang	Huida cooperative	Shandiinggaomian Village, Zhenlong Town	Litchi and longan
	Jinli cooperative	Huangdong Village, Zhenlong Town	Litchi and longan
	Lishilizhilongyan orchard	Huangdong Village, Zhenlong Town	Litchi and longan
	Potangjiao cooperative	Potangjiao Village, Zhenlong Town	Litchi
	Louzhai cooperative	Beilouzhai Village, Zhenlong Town	Litchi and longan
	Jinhuinong cooperative	Changlong Village, Zhenlong Town	Litchi and longan
Huidong	Lilong cooperative	Tantang Village, Baihua Town	Litchi and longan
	Sijixiansouwang orchard	Shouwang Village, Duozechu Town	Litchi and longan
	Lvsegaokejishiyefazhang Co., Ltd.	Datian Village, Duozechu Town	Litchi and longan
	Qianxin orchard	Qiaoxin Village, Daling Town	Litchi and longan

Jiaxinshuiguo Co., Ltd.	Xiaohedong Village, Lianghua Town	Litchi and longan
Xunliaoguanshan orchard	Chisha Village, Xunliao Coastal Tourism Resort	Litchi and longan
Niannianhong lizhikeji Co., Ltd.	Tianwu Village, Baihua Town	Litchi
Jiulongfengshengli cooperative	Xialian Village, Pingshan Town	Litchi and longan
Guangxian cooperative	Fanhe Village, Renshan Town	Litchi and longan
Qiliang cooperative	Heng She Village, Western Daya Bay	Litchi and longan
Lizhiyuan cooperative	Heng She Village, Western Daya Bay	Litchi and longan

**Table S2.** Main pollinators species of litchi and longan.

Classification		Species	Amount (Head)	Proportion	Nesting preference	Body length (mm)
Order	Family					
Hymenoptera	Apidae	Apis cerana Fabricius (farmed)	174	0.696	Hive	12
		Apis cerana Fabricius (wild)	19	0.076	Cave	12
	Halictidae	Bombus	13	0.052	Cave	20
		Ceratina cognata	6	0.024	Shaft	9
		Amegilla zonata	5	0.020	Ground	13
		Halictus sp.	4	0.016	Ground	8
	Pompilidae	Auplopus sp.	1	0.004	Ground	17
	Vespidae	Polistes (Gyrostoma) tenebrosus Lepeletier	1	0.004		
		Polistes gigas (Kirby)	1	0.004		
	Ropalidia	Ropalidia hongkongensis	2	0.008		
Diptera	Parapolybia	Parapolybia nodosa van der Vecht	1	0.004		
	Syrphidae	Sphinx morphasp	2	0.008		
		Episyrphus balteatus De Geer	4	0.016		
	Calliphoridae	Stomoxys calcitrans	6	0.024		
		Chrysomya sp.	8	0.032		
	Anthomyiidae	Anthomyia illocata Walker	4	0.016		





Table S4. Richness of pollinators in land-use types.

Num.	Land-use types Code	Tag	Type and number of pollinators	Sum	Cave	Ground	Shaft	Parasitic / predatory natural enemies	Pest
1	Litchi orchard 1	i1	Goryphusbasilaris Holmgren,1868, 1♀	1				1	
2	Litchi orchard 2	i2	Auplopus sp,1♀	1		1			
3	Longan orchard 1	o1	Evaniaappendigaster (L.) ,1♀; Halictus sp1,2♀; MegachilerixatorCockerell, 1♀; Apodynrus sp,1♀; Tiphiamalayan,1♀	6	1	2	1	2	
4	Longan orchard 2	o2	Goryphusbasilaris, 1♀	1				1	
5	Road1	d1	Tenthredinidae, 1♀; Episyronrufotibialis Tsuneki,1♀; Halictussp, 1♀	3		2			1
6	Road 2	d2	Halictussp, 1♀	1		1			
7	Field margin 1	t1	ApisceranaFabricius, 1♀; Halictussp, 2♀; Pison sp,1♂	4	1	3			
8	Field margin 2	t2	Goryphusbasilaris, 1♀; Apiscerana, 1♀; Stendynerus sp,1♀;	3	1			2	
9	Railway1	n1	Ceratina cognata,1♀	1			1		
10	Railway 2	n2	Stendynerus sp,1♀; Halictussp, 1♀	2		1		1	
11	Vegetable field 1	c1	Apiscerana, 1♀	1	1				
12	Vegetable field 2	c2	Larracarbonaria (Smith, 1858),1♀	1		1			
13	Grassland 1	hc1	Apiscerana, 1♀	1	1				
14	Grassland 2	hc2	Apiscerana, 2♀; Halictus sp, 1♀	3	2	1			
15	Orange orchard	lz	Goryphus sp.,1♀; Ropalidiarufocollaris (Cameron) , 1♀; Halictussp p (two kinds) , 2♀	4	1	2		1	
16	Clausena lansium (Lour.) Skeels	hp	Astomaspis sp,1♀; Halictus sp1,2♀	3		2		1	
17	Planted forest 1	r1	Halictus sp2 (Different from the previous species) ,3♀; Ceratina cognata,1♀; Aglaojoppa sp,1♀; Ischnussp, 1♀; Sceliphrondeformedeforme (Smith), 1♀; Bombusexi mius Smith, 1♀	8	1	4	1	2	

18	Planted forest 2	r2	Evania appendigaster,1♀; Halictus sp1,1♀; Halictus sp2,1♀; Amegillazonata (L.),1♀; Ceratina cognata,1♀; Bombuseximi us Smith,2♀ Ropalidia hongkongensis,1♀; Poliste stenebricosus, 1♀; Episyronarrogans Smith,2♀; Polistesjaponic us Saussure, 1♀; Aptesissp, 1♀; Ceratina cognata,1♀; Evania appendigaster,1♀1♂; Ichneumon sp,1♂; Epyrissp, 1♀; A uplopus sp,1♂; Episyronarrogans Smith,1♀; Bembecinus sp,1♀; Tenthredinidae, 1 ♀; Halictusspp (three kinds) , 5♀; Bombuseximius Smith, 2♀;	7	2	3	1	1
19	Natural forest 1	z1	Episyronarrogans Smith,2♀; Polistesjaponic us Saussure, 1♀; Aptesissp, 1♀; Ceratina cognata,1♀; Evania appendigaster,1♀1♂; Ichneumon sp,1♂; Epyrissp, 1♀; A uplopus sp,1♂; Episyronarrogans Smith,1♀; Bembecinus sp,1♀; Tenthredinidae, 1 ♀; Halictusspp (three kinds) , 5♀; Bombuseximius Smith, 2♀;	7	3	1	1	2
20	Natural forest 2	z2	Episyronarrogans Smith,1♀; Bembecinus sp,1♀; Tenthredinidae, 1 ♀; Halictusspp (three kinds) , 5♀; Bombuseximius Smith, 2♀;	14	3	7	3	1
21	Rural residential area 1	j1	— —	0				
22	Rural residential area 2	j2	— —	0				

**Table S5.** Biophysical parameters and relative abundance of wild bees in Huizhou, 2015-2019.

Species name	Seasonal activity	Foraging distance(m)	Relative abundance
Apis cerana Fabricius	1	424	0.402
Bombus	0.7	861.52	0.276
Ceratina cognata	0.7	259.93	0.065
Amegillazonata	0.8	478.69	0.126
Halictus sp	0.8	205.24	0.107
Auplopus sp	0.6	697.45	0.023

**Table S6.** Nested suitability and availability of nectar-pollen plant resources of the land-use types in Huizhou, 2015-2019.

Land-use types	Cave	Ground	Shaft	Nectar-pollen plant resources in litchi and longan flowering period
Grassland	0.97	0.26	0	0.0285
Rainfed cropland	0.32	0.26	0	0.0434
Construction land	0	0	0	0
Water bodies	0	0	0	0
Irrigated cropland	0	0	0	0
Unutilized land	0	0	0	0
Forest land	0.93	0.98	0.81	0.1311
Litchi and longan's orchards	0.16	0.38	0.36	0.6464