



Figure. S1 (A) The field identification site located in Yazhou district, Sanya city. (B) The area and row spacing of each experimental plot. (C) The field evaluation was based on a randomized complete block design with 4 blocks (4 replicates for each cultivar). The dashed boxes indicated the buffer zones (planting with the cultivar Dashehari for 2 rows), and the arrow indicated the direction of soil fertility in the field.

Table S1 The information of the tested twelve mango cultivars

Mango cultivars	Source	From flowering to harvest time	Mature date
Dashehari	India	120-140 d	14 th , June
Keitt	United States (Florida State)	160-180 d	21 st , August
Yuexi	China (Guangdong Province)	130-150 d	8 th , July
Zihua	China (Guangxi Province)	130-150 d	16 th , July
India 901	India	120-140 d	22 nd , June
Red ivory	China (Guangxi Province)	160-180 d	3 rd , September
Hongguang	China (Yunnan Province)	100-120 d	5 th , June
Kent	United States (Florida State)	120-140 d	10 th , July
Golden Phoenix	China (Taiwan Province)	130-150 d	2 nd , July
Sanya	China (Hainan Province)	100-120 d	11 th , June
Sunrise	United States (Florida State)	130-150 d	13 rd , August
Tainong No.1	China (Taiwan Province)	100-120 d	7 th , June

Table S2 The first round of greenhouse identification of mango cultivars resistance to mango red spider mite

Mango cultivars	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL
	0	1	2	3	4			
Dashehari	0	0	1	6	11	18	88.89	HS
Keitt	0	0	0	7	11	18	90.28	HS
Yuexi	0	1	1	2	14	18	90.28	HS
Zihua	0	1	1	9	7	18	80.56	S
India 901	0	2	2	5	9	18	79.17	S
Red ivory	1	1	4	7	5	18	69.44	S
Hongguang	0	3	2	4	9	18	76.39	S
Kent	2	4	3	7	2	18	54.17	MR
Golden Phoenix	3	3	5	5	2	18	50.00	MR
Sanya	6	5	5	1	1	18	30.56	R
Sunrise	5	7	2	3	1	18	33.33	R
Tainong No.1	12	5	1	0	0	18	9.72	HR

Note: MDI, RL denote mite damage index and resistance level, respectively; HS, S, MR, R and HR denote highly susceptible, susceptible, moderately resistant, resistant and highly resistant, respectively.

Table S3 The second round of greenhouse identification of mango cultivars resistance to mango red spider mite

Mango cultivars	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL
	0	1	2	3	4			
Dashehari	0	0	1	2	15	18	94.44	HS
Keitt	0	0	1	4	13	18	91.67	HS
Yuexi	0	0	1	3	14	18	93.06	HS
Zihua	0	1	1	3	13	18	88.89	S
India 901	0	0	6	7	5	18	73.61	S
Red ivory	0	3	5	6	4	18	65.28	S
Hongguang	0	1	2	8	7	18	79.17	S
Kent	0	1	7	8	2	18	65.28	MR
Golden Phoenix	3	3	7	4	1	18	45.83	MR
Sanya	8	4	2	3	1	18	29.17	R
Sunrise	7	5	3	1	2	18	30.56	R
Tainong No.1	11	6	1	0	0	18	11.11	HR

Note: MDI, RL denote mite damage index and resistance level, respectively; HS, S, MR, R and HR denote highly susceptible, susceptible, moderately resistant, resistant and highly resistant, respectively.

Table S4 The third round of greenhouse identification of mango cultivars resistance to mango red spider mite

Mango cultivars	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL
	0	1	2	3	4			
Dashehari	0	0	0	3	15	18	95.83	HS
Keitt	0	0	1	2	15	18	94.44	HS
Yuexi	0	0	1	4	13	18	91.67	HS
Zihua	0	1	1	1	15	18	91.67	S
India 901	0	1	4	5	8	18	77.78	S
Red ivory	1	2	5	6	4	18	63.89	S
Hongguang	0	2	2	5	9	18	79.17	S
Kent	0	1	6	7	4	18	69.44	MR
Golden Phoenix	2	5	4	6	1	18	48.61	MR
Sanya	6	3	6	2	1	18	34.72	R
Sunrise	8	6	2	2	0	18	22.22	R
Tainong No.1	14	2	1	1	0	18	9.72	HR

Note: MDI, RL denote mite damage index and resistance level, respectively; HS, S, MR, R and HR denote highly susceptible, susceptible, moderately resistant, resistant and highly resistant, respectively.

Table S5 The mite-resistance level of twelve mango cultivars under field condition

No.	Cultivars	Five years of field tests												Greenhouse tests
		2019	RL	2020	RL	2021	RL	2022	RL	2023	RL	MDI average	Overall RL	Overall RL
1	Dashehari	91.44	HS	90.62	HS	89.88	HS	88.33	HS	87.89	HS	89.63 ± 1.50 a	HS	HS
2	Keitt	89.67	HS	86.76	S	89.50	HS	88.34	HS	88.97	HS	88.65 ± 1.18 a	HS	HS
3	Yuexi	88.34	HS	89.25	HS	90.00	HS	87.15	S	81.59	S	87.27 ± 3.35 a	S	HS
4	Zihua	90.39	HS	87.18	S	88.04	HS	89.15	HS	87.99	HS	88.67 ± 1.24 a	HS	S
5	India 901	88.66	HS	87.31	S	87.89	HS	87.79	HS	88.50	HS	88.03 ± 0.55 a	HS	S
6	Red ivory	69.20	S	66.95	S	74.53	S	74.68	S	67.27	S	70.53 ± 3.82 b	S	S
7	Hongguang	70.36	S	67.94	S	71.97	S	71.99	S	67.61	S	69.97 ± 2.12 b	S	S
8	Kent	76.24	S	64.54	S	65.45	S	78.72	S	72.99	S	71.59 ± 6.36 b	S	S
9	Golden Phoenix	64.54	S	61.61	MR	59.29	MR	64.25	S	61.83	MR	62.67 ± 1.61 c	S	MR
10	Sanya	42.65	MR	33.03	R	36.14	R	40.82	MR	36.74	R	37.88 ± 3.85 d	MR	R
11	Sunrise	36.97	R	35.42	R	30.99	R	43.62	R	35.52	R	36.50 ± 3.19 d	R	R
12	Tainong No.1	12.25	HR	10.59	HR	11.87	HR	12.08	HR	10.98	HR	11.55 ± 0.73 e	HR	HR

Note: MDI, RL denote mite damage index and resistance level, respectively., HS, S, MR, R and HR denote highly susceptible, susceptible, moderately resistant, resistant and highly resistant, respectively. Different letters represent statistical differences of MDI among cultivars. The analysis was conducted based on one-way analysis of variance (ANOVA) with Turkey's honestly significant difference multiple comparison test ($P < 0.05$). For convenience of comparison, the greenhouse identification results were displayed on the rightmost column.

Table S6 The field identification results of mango cultivars resistance to mango red spider mite in the season of 2018 to 2019

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
		0	1	2	3	4					
Dashehari	Dec	2	4	16	27	131	180	89.03	S	91.44	HS
	Jan	1	5	10	21	142	179	91.62	HS		
	Feb	0	4	9	23	145	181	92.68	S		
	Mar	0	2	11	20	148	181	93.37	HS		
	Apr	1	4	13	24	132	174	90.52	HS		
Keitt	Dec	4	6	12	30	128	180	87.78	HS	89.67	HS
	Jan	2	6	9	21	143	181	91.02	HS		
	Feb	1	7	13	24	136	181	89.64	HS		
	Mar	1	6	9	12	150	178	92.70	HS		
	Apr	3	11	14	18	132	178	87.22	HS		
Yuexi	Dec	2	7	22	31	119	181	85.64	S	88.34	HS
	Jan	1	3	12	19	142	177	92.09	HS		
	Feb	0	5	20	34	122	181	87.71	HS		
	Mar	1	3	18	26	132	180	89.58	HS		
	Apr	4	11	12	23	130	180	86.67	HS		
Zihua	Dec	1	4	16	29	131	181	89.36	HS	90.39	HS
	Jan	0	2	8	27	142	179	93.16	HS		
	Feb	1	1	13	24	142	181	92.13	HS		
	Mar	1	2	16	22	137	178	91.01	HS		
	Apr	2	6	23	26	122	179	86.31	HS		
India 901	Dec	2	6	14	36	122	180	87.50	HS	88.66	HS

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
Red ivory	Jan	1	4	7	28	140	180	91.94	HS	69.20	S
	Feb	0	2	7	26	146	181	93.65	HS		
	Mar	2	5	21	19	132	179	88.27	HS		
	Apr	5	11	23	31	110	180	81.94	HS		
	Dec	7	42	45	36	50	180	61.11	S		
Hongguang	Jan	4	32	42	48	55	181	66.30	S	70.36	S
	Feb	2	3	42	53	80	180	78.61	S		
	Mar	3	9	37	51	76	176	76.70	S		
	Apr	16	27	46	29	63	181	63.26	S		
	Dec	16	29	33	46	54	178	63.06	S		
Kent	Jan	10	23	23	52	72	180	71.25	S	76.24	S
	Feb	4	19	32	42	84	181	75.28	S		
	Mar	2	15	35	51	75	178	75.56	S		
	Apr	6	29	45	39	61	180	66.67	S		
	Dec	8	18	22	37	96	181	76.93	S		
Golden Phoenix	Jan	6	14	27	38	96	181	78.18	S	64.54	S
	Feb	4	11	16	41	105	177	82.77	S		
	Mar	6	17	35	42	80	180	74.03	S		
	Apr	10	21	31	56	62	180	69.31	S		
	Dec	12	31	42	52	43	180	61.53	MR		
Phoenix	Jan	9	18	46	67	39	179	65.22	S		
	Feb	10	16	27	58	67	178	71.91	S		
	Mar	21	19	42	49	48	179	61.73	MR		

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
Sanya	Apr	12	31	42	52	43	180	61.53	MR	42.65	MR
	Dec	46	51	48	24	11	180	36.53	MR		
	Jan	34	42	52	37	13	178	43.40	MR		
	Feb	37	35	42	55	10	179	45.25	MR		
	Mar	32	32	51	48	16	179	47.77	MR		
Sunrise	Apr	42	40	56	32	11	181	40.33	MR	36.97	R
	Dec	56	54	48	12	11	181	31.77	R		
	Jan	45	46	39	32	19	181	40.88	MR		
	Feb	32	45	42	38	23	180	46.53	MR		
	Mar	56	48	60	14	2	180	30.28	R		
Tainong No.1	Apr	50	46	50	27	7	180	35.42	R	12.25	HR
	Dec	151	14	9	6	0	180	6.94	HR		
	Jan	125	28	21	4	2	180	12.50	HR		
	Feb	119	22	8	27	4	180	18.75	R		
	Mar	124	29	16	9	2	180	13.33	R		
	Apr	132	32	11	4	1	180	9.72	HR		

Note: MDI, RL denote mite damage index and resistance level, respectively; HS, S, MR, R and HR denote highly susceptible, susceptible, moderately resistant, resistant and highly resistant, respectively.

Table S7 The field identification results of mango cultivars resistance to mango red spider mite in the season of 2019 to 2020

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
		0	1	2	3	4					
Dashehari	Dec	3	6	9	22	140	180	90.28	S	90.62	
	Jan	4	7	18	21	128	178	86.80	S		HS
	Feb	5	9	21	26	120	181	84.12	S		
	Mar	0	1	3	9	167	180	97.50	HS		
	Apr	1	3	6	15	154	179	94.41	HS		
Keitt	Dec	5	9	20	35	110	179	82.96	S	86.76	S
	Jan	4	6	16	31	122	179	86.45	HS		
	Feb	8	11	24	15	122	180	82.22	S		
	Mar	2	4	11	12	151	180	92.50	HS		
	Apr	5	4	12	18	140	179	89.66	HS		
Yuexi	Dec	4	7	11	22	135	179	88.69	HS	89.25	HS
	Jan	5	8	15	16	132	176	87.22	S		
	Feb	9	13	8	31	121	182	83.24	S		
	Mar	1	4	5	11	159	180	94.86	HS		
	Apr	2	6	7	16	149	180	92.22	HS		
Zihua	Dec	2	6	16	54	101	179	84.36	S	87.78	HS
	Jan	1	7	11	48	111	178	86.66	S		
	Feb	4	7	11	82	76	180	80.42	S		
	Mar	0	3	5	9	163	180	96.11	HS		
	Apr	1	1	10	35	132	179	91.34	HS		

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
India 901	Dec	3	5	7	23	139	177	90.96	S	87.31	S
	Jan	7	7	16	35	116	181	83.98	S		
	Feb	4	6	11	29	129	179	88.13	S		
	Mar	2	5	14	19	142	182	90.38	HS		
	Apr	2	16	18	29	114	179	83.10	S		
Red ivory	Dec	9	11	42	93	26	181	66.02	S	66.95	S
	Jan	11	16	52	84	17	180	61.11	S		
	Feb	8	19	55	86	12	180	60.42	S		
	Mar	1	8	32	93	46	180	74.31	S		
	Apr	2	9	39	81	48	179	72.91	S		
Hongguang	Dec	8	11	46	62	53	180	69.58	S	67.94	S
	Jan	11	18	39	59	51	178	66.99	S		
	Feb	4	6	52	63	52	177	71.61	S		
	Mar	3	10	56	71	39	179	68.58	S		
	Apr	4	16	63	77	20	180	62.92	S		
Kent	Dec	18	32	41	29	59	179	61.03	MR	64.54	S
	Jan	16	38	37	47	42	180	58.47	MR		
	Feb	21	32	29	36	62	180	61.94	MR		
	Mar	8	12	31	56	72	179	74.02	S		
	Apr	12	28	28	48	64	180	67.22	S		
Golden Phoenix	Dec	17	23	48	53	37	178	59.83	MR	61.61	MR
	Jan	14	27	46	54	39	180	60.69	MR		
	Feb	11	36	41	51	42	181	60.64	MR		

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
Sanya	Mar	21	25	21	67	47	181	62.98	S	33.03	R
	Dec	17	23	48	53	37	178	59.83	MR		
	Dec	52	45	56	23	4	180	33.61	R		
	Jan	61	48	42	15	13	179	31.98	R		
	Feb	67	58	38	8	5	176	25.28	R		
Sunrise	Mar	35	48	58	30	8	179	39.94	MR	35.42	R
	Apr	39	53	75	8	5	180	34.31	R		
	Dec	76	27	34	26	17	180	33.47	R		
	Jan	72	31	30	32	16	181	34.67	R		
	Feb	68	45	31	21	15	180	31.94	R		
Tainong No.1	Mar	57	21	53	41	8	180	39.17	MR	10.59	HR
	Apr	53	29	60	31	8	181	37.85	MR		
	Dec	148	12	9	8	2	179	8.66	HR		
	Jan	153	7	11	7	3	181	8.56	HR		
	Feb	139	21	13	7	2	182	10.44	HR		
	Mar	124	16	22	16	1	179	15.64	R		
	Apr	142	16	12	7	2	179	9.64	HR		

Note: MDI, RL denote mite damage index and resistance level, respectively; HS, S, MR, R and HR denote highly susceptible, susceptible, moderately resistant, resistant and highly resistant, respectively.

Table S8 The field identification results of mango cultivars resistance to mango red spider mite in the season of 2020 to 2021

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
		0	1	2	3	4					
Dashehari	Dec	7	10	11	20	132	180	86.11	S	89.88	HS
	Jan	3	6	9	21	141	180	90.42	HS		
	Feb	5	14	22	14	126	181	83.43	S		
	Mar	1	1	3	10	165	180	96.81	HS		
	Apr	3	5	7	12	153	180	92.64	HS		
Keitt	Dec	5	8	14	22	131	180	86.94	S	89.50	HS
	Jan	4	6	8	18	142	178	90.45	HS		
	Feb	6	15	18	12	130	181	83.84	S		
	Mar	0	2	5	18	153	178	95.22	HS		
	Apr	1	4	12	24	138	179	91.06	HS		
Yuexi	Dec	5	8	12	23	132	180	87.36	S	90.00	HS
	Jan	3	5	7	21	144	180	91.39	HS		
	Feb	5	7	27	18	122	179	84.22	S		
	Mar	0	6	2	12	159	179	95.25	HS		
	Apr	3	4	8	19	146	180	91.81	HS		
Zihua	Dec	6	8	9	21	136	180	87.92	HS	88.04	HS
	Jan	5	8	19	32	115	179	84.08	S		
	Feb	5	13	13	43	105	179	82.12	S		
	Mar	0	3	7	15	155	180	94.72	HS		
	Apr	2	3	11	23	140	179	91.34	HS		
India 901	Dec	3	9	12	27	129	180	87.50	S	87.89	HS

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
Red ivory	Jan	6	8	16	24	126	180	85.56	S	74.53	S
	Feb	2	7	10	21	138	178	90.17	S		
	Mar	2	9	16	37	117	181	85.64	S		
	Apr	1	7	12	19	142	181	90.61	S		
	Dec	6	22	57	49	46	180	64.86	S		
Hongguang	Jan	1	6	43	72	57	179	74.86	S	71.97	S
	Feb	5	13	46	59	56	179	70.67	S		
	Mar	2	3	20	68	86	179	82.54	S		
	Apr	3	2	28	72	75	180	79.72	S		
	Dec	6	10	59	75	30	180	65.69	S		
Kent	Jan	7	12	47	70	45	181	68.51	S	65.45	S
	Feb	4	6	52	63	52	177	71.61	S		
	Mar	2	4	37	56	81	180	79.17	S		
	Apr	0	6	49	63	60	178	74.86	S		
	Dec	27	39	25	32	56	179	57.12	MR		
Golden Phoenix	Jan	21	19	28	41	72	181	67.13	S	61.09	MR
	Feb	20	26	32	45	58	181	63.12	S		
	Mar	12	16	23	56	72	179	72.35	S		
	Apr	15	18	34	49	62	178	67.56	S		
	Dec	15	26	41	54	45	181	62.15	MR		
	Jan	19	31	42	48	41	181	58.43	MR		
	Feb	22	31	35	42	51	181	59.53	MR		
	Mar	17	22	46	43	51	179	62.43	MR		

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
Sanya	Apr	15	26	41	54	45	181	62.15	MR	36.14	R
	Dec	52	42	39	35	12	180	37.92	MR		
	Jan	69	27	43	26	13	178	34.13	R		
	Feb	78	36	35	22	9	180	28.89	R		
	Mar	56	26	42	38	20	182	41.76	MR		
Sunrise	Apr	61	30	35	45	10	181	37.98	MR	30.99	R
	Dec	99	33	27	6	15	180	22.92	R		
	Jan	76	22	43	18	21	180	34.17	R		
	Feb	82	36	30	22	9	179	27.65	R		
	Mar	60	26	41	39	15	181	39.36	MR		
Tainong No.1	Apr	68	36	48	22	6	180	30.83	R	11.87	HR
	Dec	146	15	9	6	3	179	8.80	HR		
	Jan	136	25	7	6	6	180	11.25	HR		
	Feb	139	24	7	2	8	180	10.56	HR		
	Mar	125	28	13	9	5	180	14.03	R		
	Apr	129	23	11	7	10	180	14.72	R		

Note: MDI, RL denote mite damage index and resistance level, respectively; HS, S, MR, R and HR denote highly susceptible, susceptible, moderately resistant, resistant and highly resistant, respectively.

Table S9 The field identification results of mango cultivars resistance to mango red spider mite in the season of 2021 to 2022

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
		0	1	2	3	4					
Dashehari	Dec	2	13	22	27	115	179	83.52	S	88.33	HS
	Jan	2	2	17	28	131	180	89.44	HS		
	Feb	5	9	25	44	96	179	80.31	S		
	Mar	0	2	8	10	162	182	95.60	HS		
	Apr	1	2	10	22	145	180	92.78	HS		
Keitt	Dec	3	9	18	35	116	181	84.81	S	88.34	HS
	Jan	3	5	12	22	138	180	89.86	HS		
	Feb	7	13	22	18	120	180	82.08	S		
	Mar	0	2	6	16	156	180	95.28	HS		
	Apr	5	4	12	18	140	179	89.66	HS		
Yuexi	Dec	4	11	23	25	117	180	83.33	s	87.15	S
	Jan	6	11	14	8	142	181	87.15	s		
	Feb	7	20	17	31	105	180	78.75	s		
	Mar	1	4	11	5	159	180	94.03	HS		
	Apr	6	3	9	3	159	180	92.50	HS		
Zihua	Dec	5	6	18	22	131	182	86.81	s	89.15	HS
	Jan	3	7	6	28	136	180	89.86	HS		
	Feb	6	13	22	24	114	179	81.70	S		
	Mar	1	2	8	12	158	181	94.75	HS		
	Apr	2	3	6	24	145	180	92.64	HS		
India 901	Dec	7	6	15	28	125	181	85.64	S	87.79	HS

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
Red ivory	Jan	4	8	13	27	128	180	87.08	S	74.68	S
	Feb	6	11	11	31	121	180	84.72	S		
	Mar	2	7	9	10	152	180	92.08	HS		
	Apr	3	7	6	31	133	180	89.44	HS		
	Dec	4	32	48	20	76	180	68.33	S		
Hongguang	Jan	5	11	38	42	82	178	75.98	S	71.99	S
	Feb	5	23	41	39	72	180	70.83	S		
	Mar	2	10	36	32	98	178	80.06	S		
	Apr	3	12	28	52	84	179	78.21	S		
	Dec	15	22	26	39	78	180	69.86	S		
Kent	Jan	11	23	32	38	76	180	70.14	S	78.72	S
	Feb	8	26	36	31	78	179	70.25	S		
	Mar	8	10	31	49	82	180	75.97	S		
	Apr	9	14	27	56	73	179	73.74	S		
	Dec	8	12	26	39	95	180	77.92	S		
Golden Phoenix	Jan	6	23	35	25	91	180	73.89	S	64.25	S
	Feb	12	16	31	46	76	181	71.82	S		
	Mar	3	5	16	39	115	178	86.24	S		
	Apr	2	3	27	46	102	180	83.75	S		
	Dec	37	32	33	38	40	180	51.67	MR		
	Jan	8	20	49	46	57	180	67.22	s		
	Feb	20	22	33	49	56	180	63.75	S		
	Mar	12	19	28	45	76	180	71.39	S		

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
Sanya	Apr	37	32	33	38	40	180	51.67	MR	40.82	MR
	Dec	48	51	32	32	17	180	38.75	MR		
	Jan	54	33	42	38	13	180	39.31	MR		
	Feb	61	53	26	29	12	181	33.15	R		
	Mar	42	31	36	42	29	180	47.92	MR		
Sunrise	Apr	43	33	37	51	16	180	45.00	MR	43.62	R
	Dec	24	27	53	48	27	179	53.77	MR		
	Jan	29	32	53	46	20	180	49.44	MR		
	Feb	53	54	30	27	16	180	35.97	R		
	Mar	48	40	48	33	11	180	38.75	MR		
Tainong No.1	Apr	48	38	42	41	11	180	40.14	MR	12.08	HR
	Dec	146	13	8	12	2	181	10.08	HR		
	Jan	126	27	19	5	2	179	12.29	HR		
	Feb	142	12	13	9	3	179	10.75	HR		
	Mar	127	26	18	5	3	179	12.43	R		
	Apr	116	34	15	7	5	177	14.83	R		

Table S10 The field identification results of mango cultivars resistance to mango red spider mite in the season of 2022 to 2023

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
		0	1	2	3	4					
Dashehari	Dec	3	6	24	31	116	180	84.86	S	87.89	HS
	Jan	1	9	6	20	415	451	96.51	HS		
	Feb	1	7	12	27	132	179	89.39	HS		
	Mar	9	12	23	31	105	180	79.31	S		
	Apr	2	5	13	27	132	179	89.39	HS		
Keitt	Dec	2	7	8	24	138	179	90.36	HS	88.97	HS
	Jan	5	11	13	25	124	178	85.39	S		
	Feb	7	14	15	22	122	180	83.06	S		
	Mar	0	1	6	20	153	180	95.14	HS		
	Apr	2	4	12	21	140	179	90.92	HS		
Yuexi	Dec	8	16	31	27	98	180	76.53	S	81.59	S
	Jan	4	9	13	21	132	179	87.43	s		
	Feb	1	10	24	27	119	181	84.94	s		
	Mar	6	13	19	20	122	180	83.19	S		
	Apr	7	14	36	33	91	181	75.83	S		
Zihua	Dec	4	8	12	29	128	181	87.15	s	87.99	HS
	Jan	0	9	11	24	136	180	89.86	HS		
	Feb	2	6	12	18	142	180	90.56	S		
	Mar	4	11	18	15	132	180	86.11	S		
	Apr	4	9	15	26	126	180	86.25	S		
India 901	Dec	2	6	7	27	137	179	90.64	HS	88.50	HS

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
Red ivory	Jan	5	13	9	24	128	179	85.89	S	67.27	S
	Feb	1	3	9	28	140	181	91.85	HS		
	Mar	4	9	18	17	132	180	86.67	S		
	Apr	7	5	11	26	132	181	87.43	S		
	Dec	10	38	42	31	58	179	62.43	S		
Hongguang	Jan	6	18	36	47	71	178	72.33	S	67.61	S
	Feb	2	12	31	51	84	180	78.19	S		
	Mar	16	29	48	23	62	178	62.08	MR		
	Apr	17	31	45	26	60	179	61.31	MR		
	Dec	18	26	31	42	63	180	64.72	S		
Kent	Jan	12	26	33	32	76	179	68.72	S	72.99	S
	Feb	6	18	30	42	81	177	74.58	S		
	Mar	16	23	37	40	62	178	65.31	S		
	Apr	15	24	40	39	60	178	64.75	S		
	Dec	7	16	32	35	90	180	75.69	S		
Golden Phoenix	Jan	11	20	31	37	80	179	71.65	S	61.83	MR
	Feb	6	11	23	48	91	179	78.91	S		
	Mar	10	23	37	39	71	180	69.17	S		
	Apr	7	25	36	42	68	178	69.52	S		
	Dec	18	28	32	53	48	179	61.87	MR		
Phoenix	Jan	22	36	35	37	50	180	57.92	MR		
	Feb	16	23	37	42	62	180	65.42	S		
	Mar	16	29	41	47	48	181	61.33	MR		

Mango cultivars	Examined month	Leaf No. corresponding to mite damage scale					Total examined leaves No.	MDI	RL	MDI mean	Overall RL
Sanya	Apr	18	28	32	53	48	179	61.87	MR	36.74	R
	Dec	42	49	41	39	9	180	39.44	MR		
	Jan	52	53	46	21	8	180	33.33	MR		
	Feb	42	48	35	42	12	179	40.78	R		
	Mar	48	51	42	32	7	180	35.97	MR		
Sunrise	Apr	46	56	49	24	5	180	34.17	MR	35.52	R
	Dec	54	61	40	18	6	179	30.59	R		
	Jan	46	52	43	32	7	180	36.39	R		
	Feb	38	49	38	34	21	180	43.19	R		
	Mar	58	43	57	16	6	180	31.81	MR		
Tainong No.1	Apr	54	41	52	23	11	181	35.64	MR	10.98	HR
	Dec	147	17	9	6	3	182	8.93	HR		
	Jan	138	21	12	5	3	179	10.06	HR		
	Feb	124	16	22	13	7	182	17.45	HR		
	Mar	138	24	12	5	1	180	9.31	R		
	Apr	141	21	11	5	2	180	9.17	R		

Note: MDI, RL denote mite damage index and resistance level, respectively; HS, S, MR, R and HR denote highly susceptible, susceptible, moderately resistant, resistant and highly resistant, respectively.

Table S11 Sum of temperature in two meters above ground, the data were collected by a weather station at the location in Yazhou district, Sanya city.

Record month	Sum of temperature (°C)					Mean
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	
Dec	152.6	152.9	151.6	147.8	161.1	153.2
Jan	172.6	153.3	137.4	155.7	176.0	159.0
Feb	189.3	155.9	150.7	149.2	192.0	167.4
Mar	199.2	178.4	175.0	176.9	202.2	186.3
Apr	204.7	182.7	189.8	181.8	211.5	194.1
May	211.2	212.1	209.1	195.2	211.7	207.9
Jun	115.8	212.3	215.3	209.7	210.3	192.7
Jul	207.0	211.7	209.0	208.7	206.0	208.5
Aug	198.9	206.4	211.6	204.4	190.3	202.3
Sept	181.6	207.6	196.2	202.4	167.0	191.0
Oct	173.3	186.1	184.0	183.7	160.3	177.5
Nov	156.9	175.1	174.4	177.9	145.9	166.0

Table S12 Sum of precipitation one meter above ground, the data were collected by a weather station at the location in Yazhou district, Sanya city.

Record month	Sum of precipitation (mm)					Mean
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	
Dec	28.7	3.2	149.6	19.5	19	44.0
Jan	126	32.7	0.0	23.3	618.7	160.1
Feb	191.5	11.9	116.5	61.3	1287.7	333.8
Mar	241.2	39.0	0.8	7.0	1104.9	278.6
Apr	234.7	125.4	175.0	152.8	460.7	229.7
May	230.4	139.1	197.9	715.0	489.3	354.3
Jun	31.6	385.4	391.6	175.2	237.7	244.3
Jul	35.2	386.0	801.4	820.2	911.4	590.8
Aug	23.2	2238.1	90.1	1456.0	24.9	766.5
Sept	9.7	1674.8	968.0	990.7	197.1	768.1
Oct	2.5	2646.9	1054.8	1143.2	1.5	969.8
Nov	4.9	265.5	2.5	236.5	26.2	107.1

Table S13 Recorded average of relative air humidity two meters above ground, the data were collected by a weather station at the location in Yazhou district, Sanya city.

Record month	Mean relative air humidity (%)					Mean
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	
Dec	82.9	80.3	81.1	79.1	86.8	82.0
Jan	86.5	92.3	79.7	92.4	85.9	87.4
Feb	88.0	91.2	85.3	95.7	92.1	90.4
Mar	85.9	96.3	91.2	94.7	93.1	92.2
Apr	90.8	92.9	92.1	92.6	89.7	91.6
May	89.0	90.4	91.2	96.8	91.9	91.8
Jun	89.4	91.7	89.4	97.5	92.6	92.1
Jul	88.7	91.0	90.2	94.2	92.6	91.3
Aug	90.5	91.8	89.4	94.6	95.5	92.3
Sept	92.0	90.8	91.8	91.4	91.6	91.5
Oct	91.9	90.2	92.3	87.1	89.8	90.3
Nov	86.3	84.4	83.5	93.4	85.5	86.6

Table S14 Stepwise linear regression equations for weather parameter on mite damage index in mango cultivars

Seasons	Cultivars	Prediction equations	R ²
2018-2019	Dashehari	$Y = 60.58 - 0.042 X_1 - 0.043 X_2 + 0.44 X_3$	0.9213
	Keitt	$Y = 69.53 - 0.075 X_1 - 0.064 X_2 + 0.38 X_3$	0.5560
	Yuexi	$Y = 160.59 + 0.16 X_1 - 0.37 X_2 - 1.06 X_3$	0.7750
	Zihua	$Y = 96.39 - 0.11 X_1 - 0.15 X_2 + 0.16 X_3$	0.9860
	India 901	$Y = 64.19 - 0.28 X_1 - 0.13 X_2 + 0.83 X_3$	0.9690
	Red ivory	$Y = -203.96 - 0.61 X_1 + 0.29 X_2 + 4.22 X_3$	0.9987
	Hongguang	$Y = -26.83 - 0.17 X_1 - 0.15 X_2 + 1.45 X_3$	0.9678
	Kent	$Y = 19.26 - 0.40 X_1 + 0.04 X_2 + 1.42 X_3$	0.8216
	Golden Phoenix	$Y = -131.79 - 0.19 X_1 + 0.097 X_2 + 2.52 X_3$	0.7968
	Sanya	$Y = -26.06 - 0.083 X_1 - 0.14 X_2 + 0.96 X_3$	0.8800
	Sunrise	$Y = 118.03 + 0.17 X_1 - 0.61 X_2 - 1.15 X_3$	0.4840
	Tainong No.1	$Y = -62.40 - 0.15 X_1 - 0.12 X_2 + 1.15 X_3$	0.9200
2019-2020	Dashehari	$Y = 25.11 + 0.62 X_1 - 0.078 X_2 - 0.36 X_3$	0.9959
	Keitt	$Y = 53.37 + 0.041 X_1 + 0.039 X_2 + 0.27 X_3$	0.775
	Yuexi	$Y = 32.10 + 0.52 X_1 - 0.070 X_2 - 0.27 X_3$	0.9943
	Zihua	$Y = 101.50 + 0.60 X_1 - 0.067 X_2 - 1.21 X_3$	0.9950
	India 901	$Y = -34.62 + 1.00 X_1 - 0.14 X_2 - 0.52 X_3$	0.9985
	Red ivory	$Y = -1.12 + 0.65 X_1 - 0.056 X_2 - 0.41 X_3$	0.9765
	Hongguang	$Y = 58.93 + 0.051 X_1 - 0.077 X_2 + 0.042 X_3$	0.8825
	Kent	$Y = -29.60 + 0.54 X_1 - 0.079 X_2 + 0.10 X_3$	0.8447
	Golden Phoenix	$Y = -47.59 + 0.23 X_1 - 0.032 X_2 + 0.84 X_3$	0.9667
	Sanya	$Y = -36.35 + 0.65 X_1 - 0.012 X_2 - 0.37 X_3$	0.9762
	Sunrise	$Y = -1.27 + 0.20 X_1 - 0.011 X_2 + 0.039 X_3$	0.8091
	Tainong No.1	$Y = -41.29 + 0.22 X_1 - 0.060 X_2 + 0.21 X_3$	0.7959
2020-2021	Dashehari	$Y = 106.50 + 0.52 X_1 - 0.078 X_2 - 0.36 X_3$	0.9981
	Keitt	$Y = 114.00 + 0.46 X_1 - 0.057 X_2 - 1.08 X_3$	1.0000
	Yuexi	$Y = 119.20 + 0.48 X_1 - 0.057 X_2 - 1.17 X_3$	0.9953
	Zihua	$Y = 25.88 + 0.59 X_1 - 0.077 X_2 - 0.35 X_3$	0.9872
	India 901	$Y = 33.61 - 0.049 X_1 - 0.043 X_2 + 0.63 X_3$	0.8442
	Red ivory	$Y = 15.22 + 0.21 X_1 - 0.058 X_2 + 0.37 X_3$	0.9045
	Hongguang	$Y = -16.52 - 0.094 X_1 - 0.022 X_2 + 1.23 X_3$	0.9998
	Kent	$Y = 13.29 + 0.059 X_1 - 0.053 X_2 + 0.55 X_3$	0.9108
	Golden Phoenix	$Y = 134.40 + 1.120 X_1 - 0.17 X_2 - 3.03 X_3$	0.8369
	Sanya	$Y = 91.86 + 0.67 X_1 - 0.049 X_2 - 1.85 X_3$	0.8450
	Sunrise	$Y = -4.27 + 0.12 X_1 - 0.072 X_2 + 0.26 X_3$	0.9663
	Tainong No.1	$Y = -9.50 + 0.090 X_1 - 0.013 X_2 + 0.094 X_3$	0.8752

Seasons	Cultivars	Prediction equations	R ²
2021-2022	Dashehari	$Y = 23.94 + 0.44 X_1 - 0.044 X_2 - 0.060 X_3$	0.9266
	Keitt	$Y = 34.94 + 0.35 X_1 - 0.057 X_2 - 0.0045 X_3$	0.9343
	Yuexi	$Y = 30.49 + 0.46 X_1 - 0.036 X_2 - 0.18 X_3$	0.9534
	Zihua	$Y = 48.04 + 0.38 X_1 - 0.037 X_2 - 0.20 X_3$	0.9205
	India 901	$Y = 55.10 + 0.22 X_1 - 0.025 X_2 - 0.01 X_3$	1.0000
	Red ivory	$Y = 9.42 + 0.28 X_1 - 0.025 X_2 + 0.23 X_3$	0.9378
	Hongguang	$Y = 41.12 + 0.18 X_1 - 0.017 X_2 + 0.026 X_3$	0.9287
	Kent	$Y = 39.89 + 0.46 X_1 - 0.031 X_2 - 0.38 X_3$	0.9560
	Golden Phoenix	$Y = -101.40 + 0.74 X_1 - 0.031 X_2 + 0.33 X_3$	0.9344
	Sanya	$Y = -2.62 + 0.41 X_1 - 0.023 X_2 - 0.25 X_3$	0.8007
	Sunrise	$Y = -3.56 + 0.18 X_1 - 0.014 X_2 + 0.14 X_3$	0.9749
	Tainong No.1	$Y = -3.47 + 0.077 X_1 + 0.011 X_2 + 0.027 X_3$	0.8896
2022-2023	Dashehari	$Y = 32.26 - 0.44 X_1 - 0.067 X_2 + 1.47 X_3$	0.6780
	Keitt	$Y = 36.11 + 0.59 X_1 - 0.900 X_2 - 0.44 X_3$	0.9852
	Yuexi	$Y = 12.31 - 0.30 X_1 - 0.02 X_2 + 1.37 X_3$	0.4802
	Zihua	$Y = 55.56 - 0.29 X_1 - 0.02 X_2 + 0.90 X_3$	0.9933
	India 901	$Y = -17.16 - 0.60 X_1 - 0.02 X_2 + 2.26 X_3$	0.7517
	Red ivory	$Y = -107.47 - 1.22 X_1 - 0.07 X_2 + 4.23 X_3$	0.9694
	Hongguang	$Y = -49.35 - 0.70 X_1 - 0.04 X_2 + 2.61 X_3$	0.8792
	Kent	$Y = 68.31 - 0.18 X_1 - 0.03 X_2 + 0.41 X_3$	0.4921
	Golden Phoenix	$Y = -100.76 - 0.78 X_1 - 0.08 X_2 + 3.17 X_3$	0.618
	Sanya	$Y = 43.71 - 0.02 X_1 - 0.009 X_2 - 0.045 X_3$	0.7120
	Sunrise	$Y = -138.90 - 0.81 X_1 - 0.058 X_2 + 3.46 X_3$	0.9746
	Tainong No.1	$Y = -93.99 - 0.54 X_1 - 0.033 X_2 + 2.18 X_3$	0.7005

SI Appendix

Mann–Kendall test

The main functions of Mann-Kendall test of time series m_k can be expressed as (Burn and Elnur, 2002; Güçlü, 2020; Mann, 1945):

$$(E1) \quad m_k = \sum_{i=1}^k r_i (k = 2, 3, \dots, n)$$

$$(E2) \quad r_i = \begin{cases} 1, & x_i > x_j \\ 0, & x_i \leq x_j \end{cases} \quad (j = 1, 2, \dots, i-1)$$

$$(E3) \quad E(m_k) = \frac{n^2 - n}{4}$$

$$(E4) \quad V(m_k) = \frac{(n^2 - n)(2n + 5)}{72}$$

$$(E5) \quad UF_k = \frac{m_k - E(m_k)}{\sqrt{V(m_k)}} (k = 2, 3, \dots, n)$$

$$(E6) \quad UB_k = -UF_k (k = 2, 3, \dots, n)$$

where n is the sample size, x_i and x_j are the time series, $1 \leq j < i$, UF is the forward sequence with a standard normal distribution, and UB is the backward sequence.

SI Appendix references

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