

First field release of the Cape-ivy shoot tip-galling fly along the California coast

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Cape-ivy (*Delairea odorata*, Asteraceae)



- Vine-like perennial.
- Native to South Africa.
- Flowers in the winter.
- Highly invasive in California!



World distribution of Cape-ivy



Cape-ivy distribution in California

Found all along
California coastline.

- Riparian habitats
- Coastal scrub
- Non-coniferous mountain forests
- Urban/agricultural areas



Big Sur, CA



Half Moon Bay, CA

Current Cape-ivy management methods

Manual removal



“Friends of Five Creeks” volunteers hand-pulling Cape-ivy.

Herbicide treatments



- Glyphosate
- Triclopyr
- Clopyralid

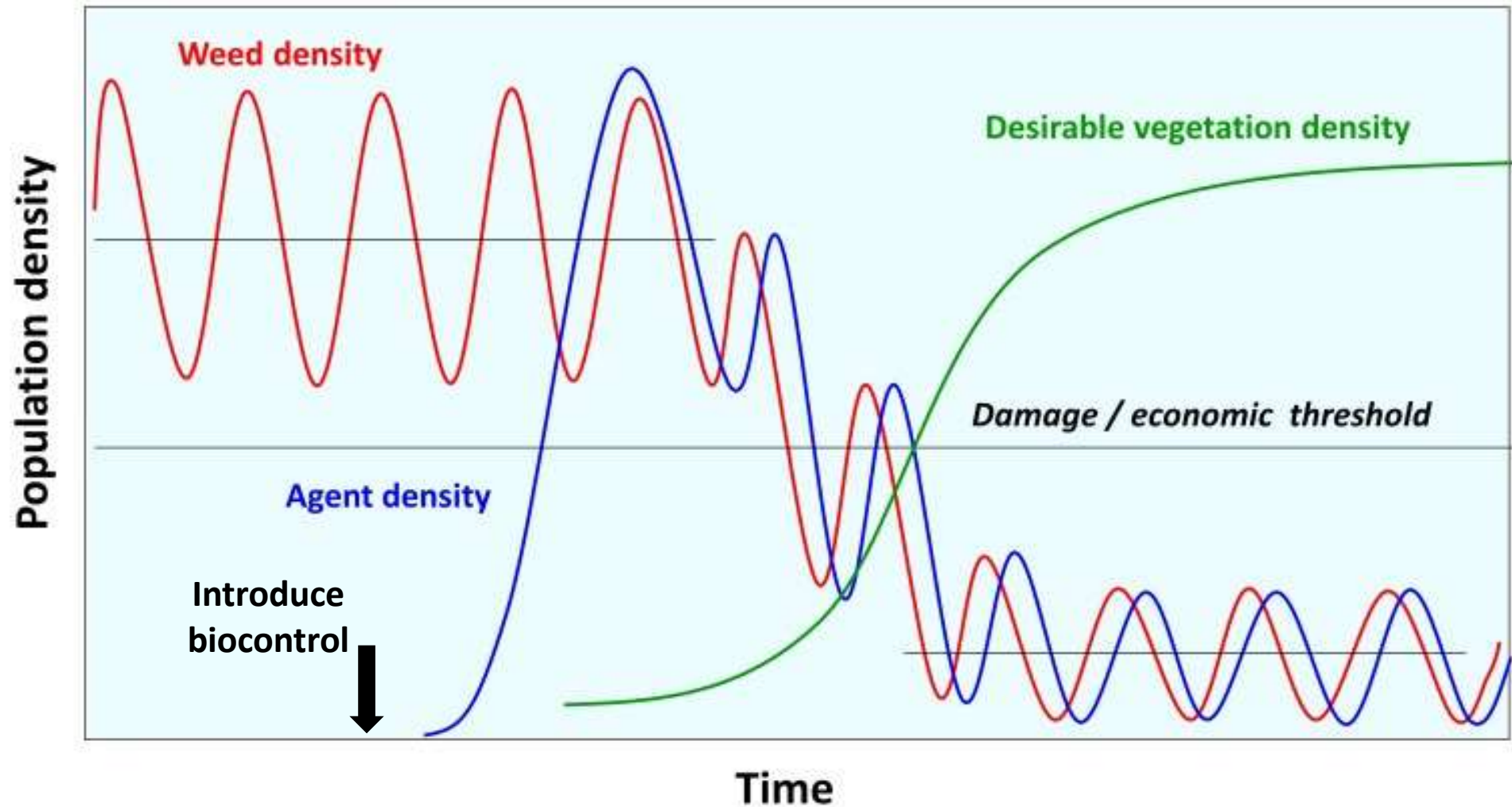
Are these methods working?

- Cape-ivy grows and spreads too rapidly to be effectively managed with manual removal or herbicide treatments.
- Often found in locations that are too difficult or too hazardous to access.



Biological control is a better way!

Weed biological control equilibrium



Cape-ivy shoot tip-galling fly



Parafreutreta regalis
(Tephritidae)

galled plant vs. healthy plant

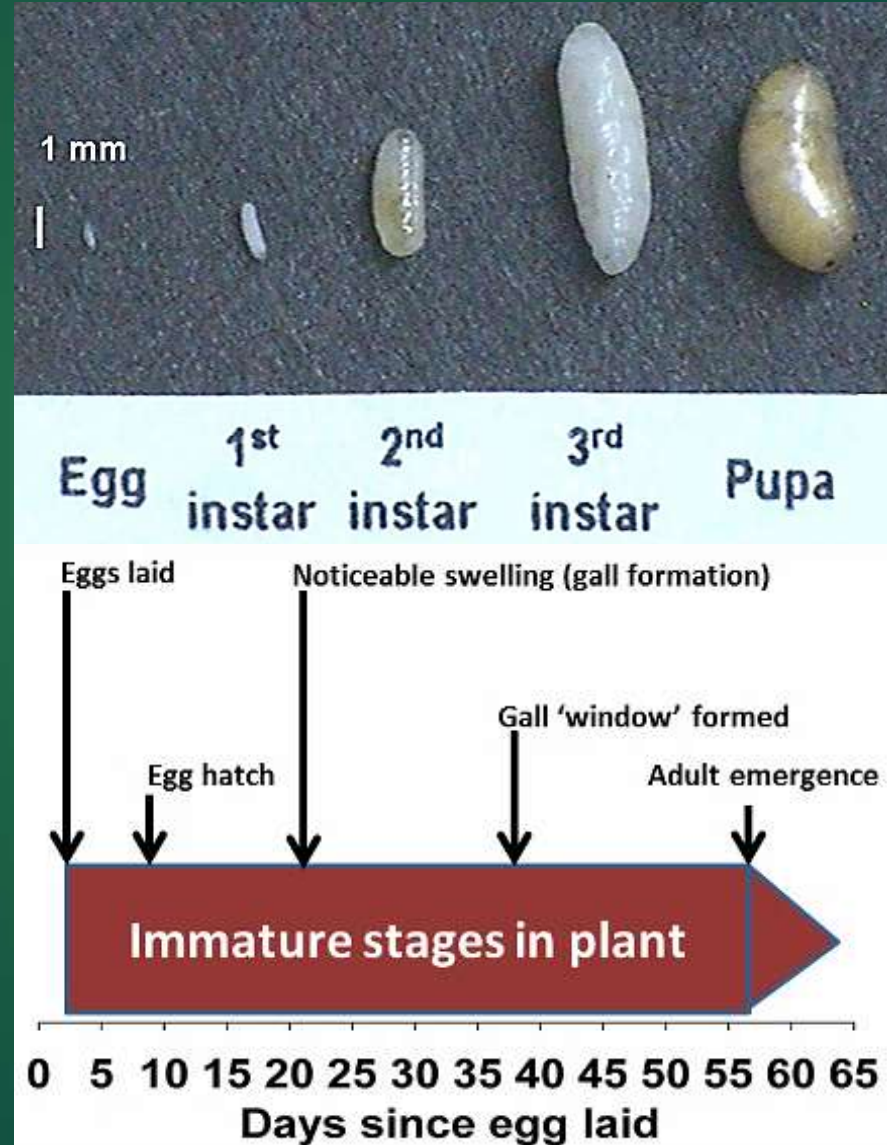


P. regalis field releases

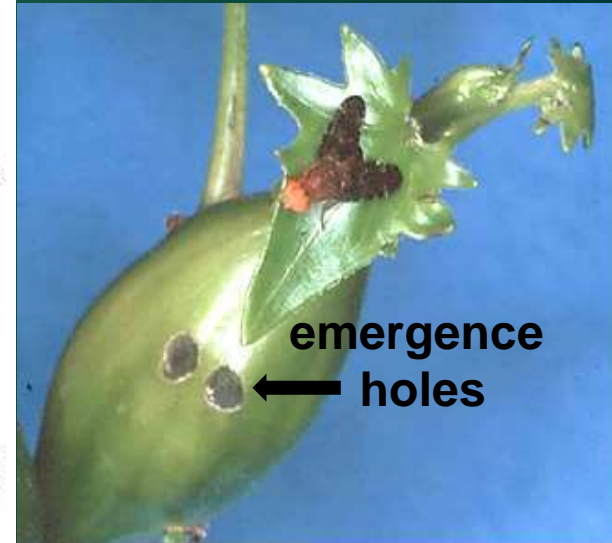


Field cage

- Flies released in field cages.
- Cages removed after 3-4 weeks.
- Plots surveyed for galls.



(25° C, 65% RH)



Parafreutreta regalis releases 2017



- Moonstone – Humboldt Co.
Trinidad Land Trust
- Elk – Mendocino Co.
Elk Cove Inn & Spa
- Timber Cove – Sonoma Co.
Harrison Ranch
- San Francisco – San Francisco Co.
The Presidio
- Oakland – Alameda Co.
Leona Canyon Park
- Fremont – Alameda Co.
Mission Peak Park
- Half Moon Bay – San Mateo Co.
Quarry Park
- Big Sur – Monterey Co.
Glen Deven Ranch
- San Luis Obispo – San Luis Obispo Co.
Land Conservancy of SLO
- Santa Barbara – Santa Barbara Co.
Toro Canyon Park

Field production – 2017 release

Location	County	Release Date	Total Galls	Galls w/ windows	Galls w/ exit holes	Adults emerged
Timber Cove	Sonoma	May, 23	17	13	13	23
Leona Canyon Park	Alameda	May, 24	14	1	1	1
Mission Peak	Alameda	May, 24	37	33	32	119
Glen Deven (Valley)	Monterey	June, 2	7	4	4	14
Glen Deven (Hillside)	Monterey	June, 2	16	7	7	27
The Presidio	San Francisco	June, 12	25	18	18	71
Land Conservancy SLO	San Luis Obispo	July, 19	12	9	8	30
Toro Canyon Park	Santa Barbara	July, 20	2	0	0	0
Quarry Park	San Mateo	July, 26	10	6	6	17
Elk Cove Inn	Mendocino	August, 10	16	8	7	28
Moonstone	Humboldt	August, 11	3	?	?	?

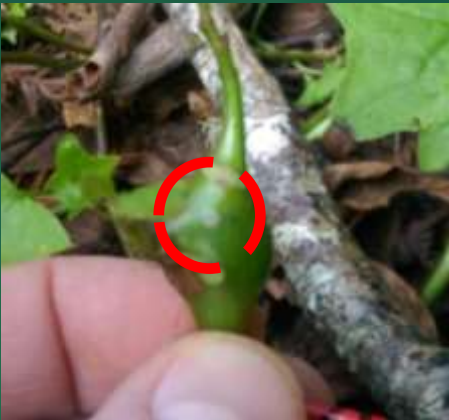
- Total field galls = 147
- Total # of adults = 330

2nd generation field galls found at Mission Peak

1st generation adults



field gall



with window



with exit hole



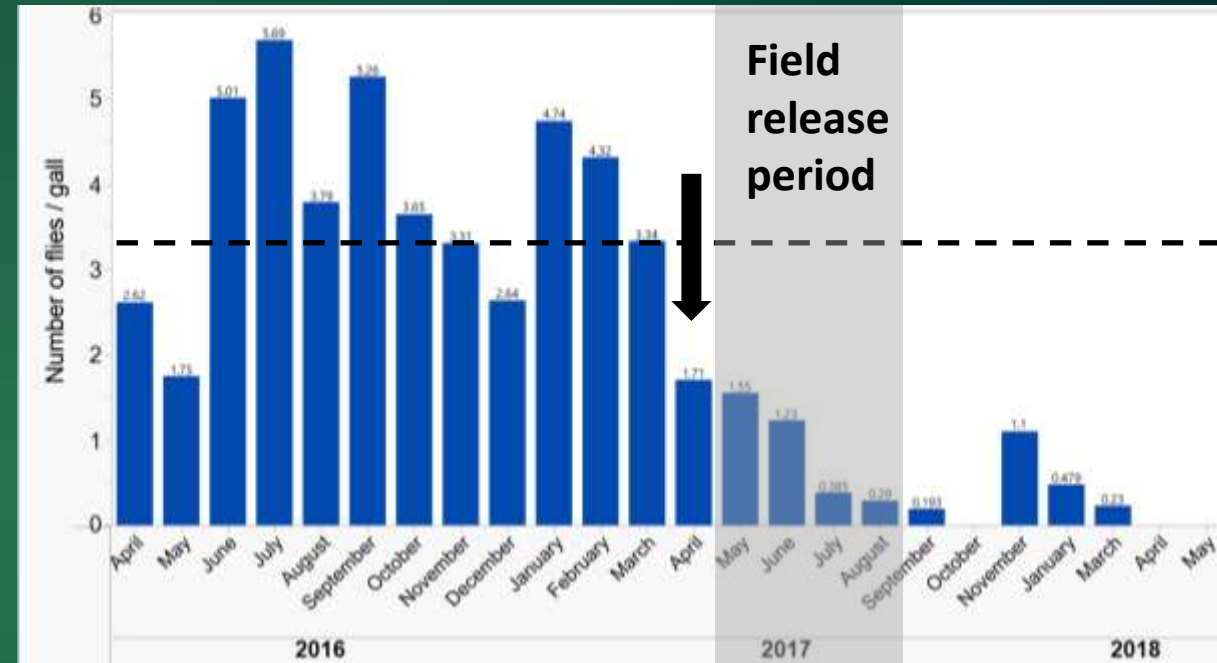
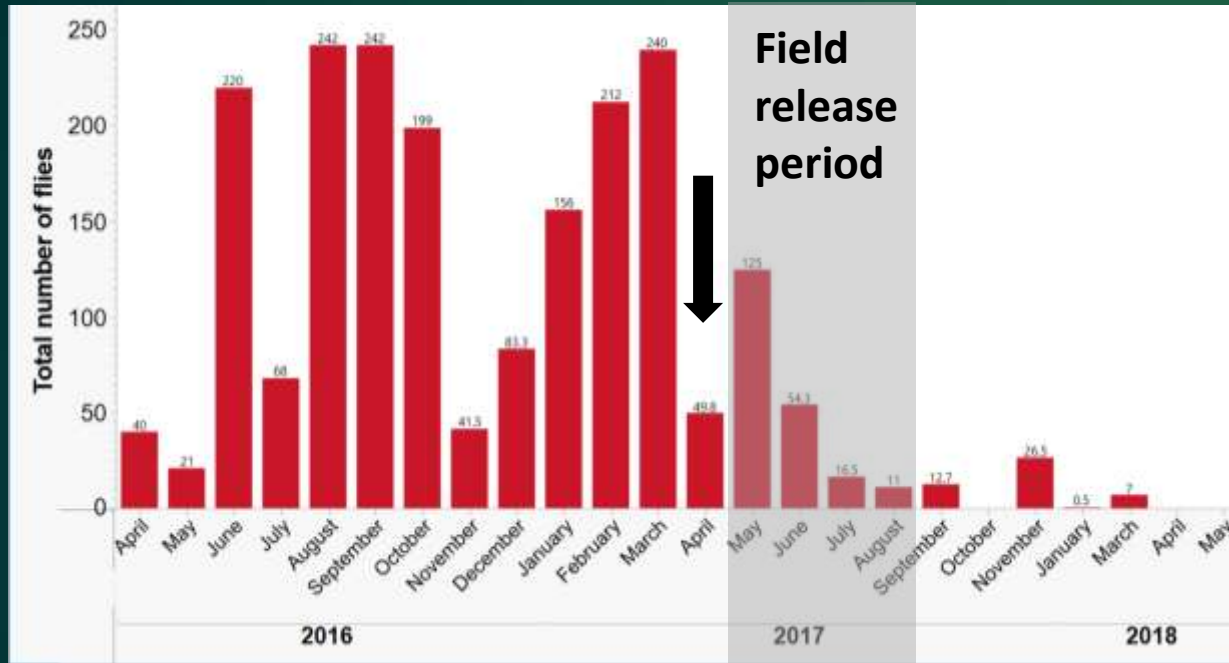
New field galls!



2nd generation adults



P. regalis colony collapse - 2017



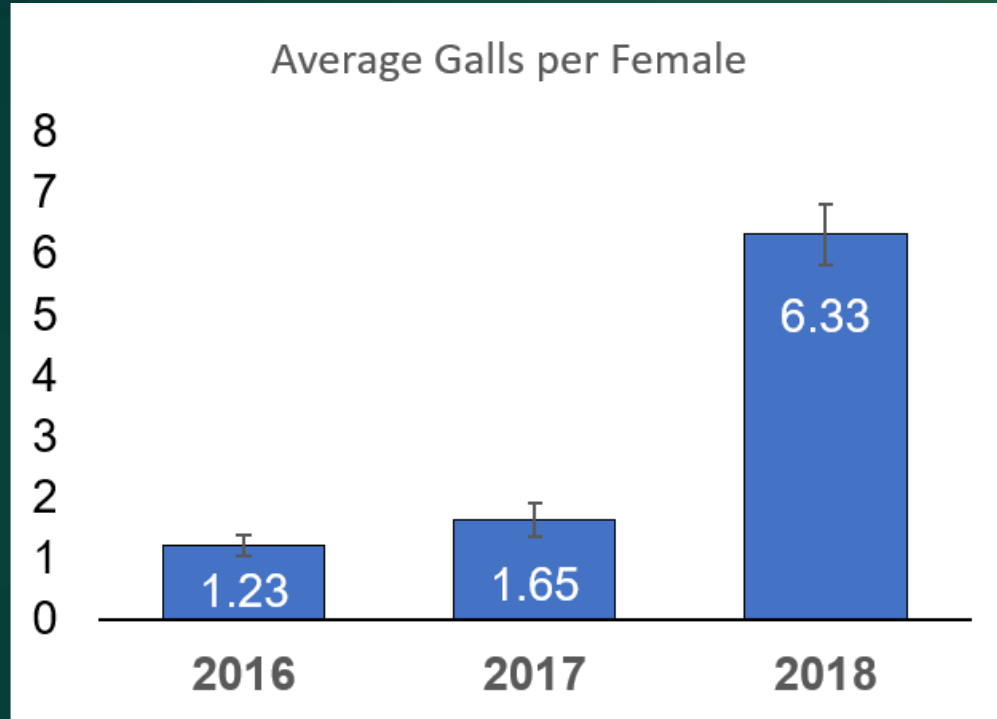
- During the decline, the plants were still producing galls, but few flies emerged.
- Many flies were dying inside the galls – suggesting the flies were sick (inbred).

New insect stock was collected from the field in SA

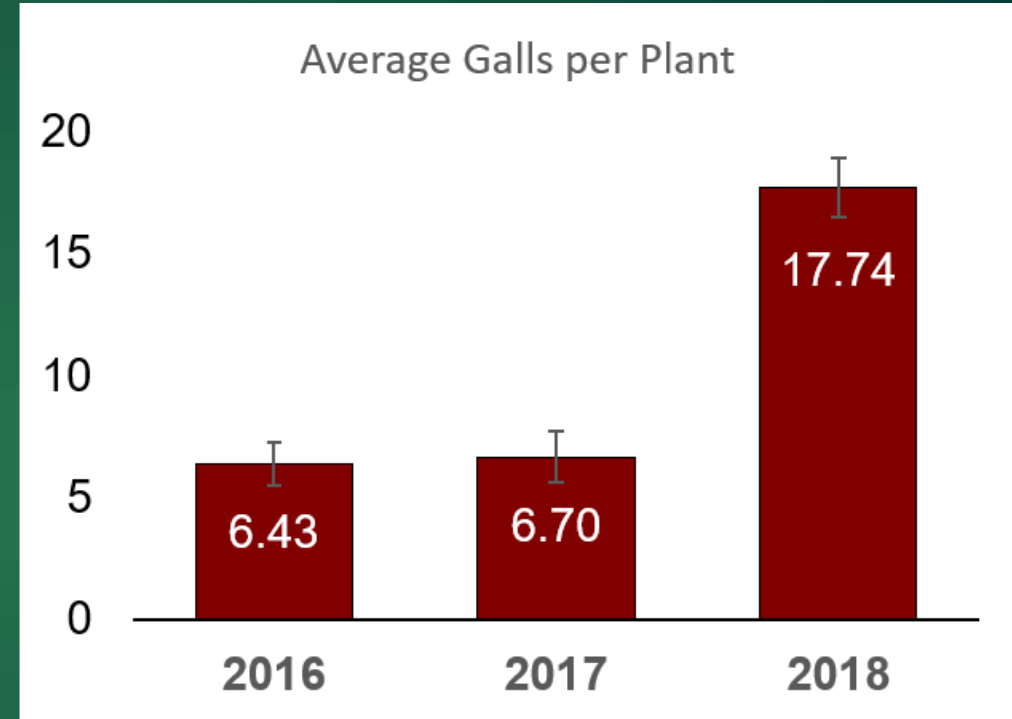


- April 2018, ~100 *P. regalis* galls were collected from Wilderness, in the Western Cape, South Africa
- Galls from South Africa were brought back to the USDA quarantine facility in Albany CA.
- Flies that emerged from the SA galls were used to start new colonies.
- Flies were reared for 2 generations before they were released into the field.

New colony production Stats



Females producing 4.4X more galls!

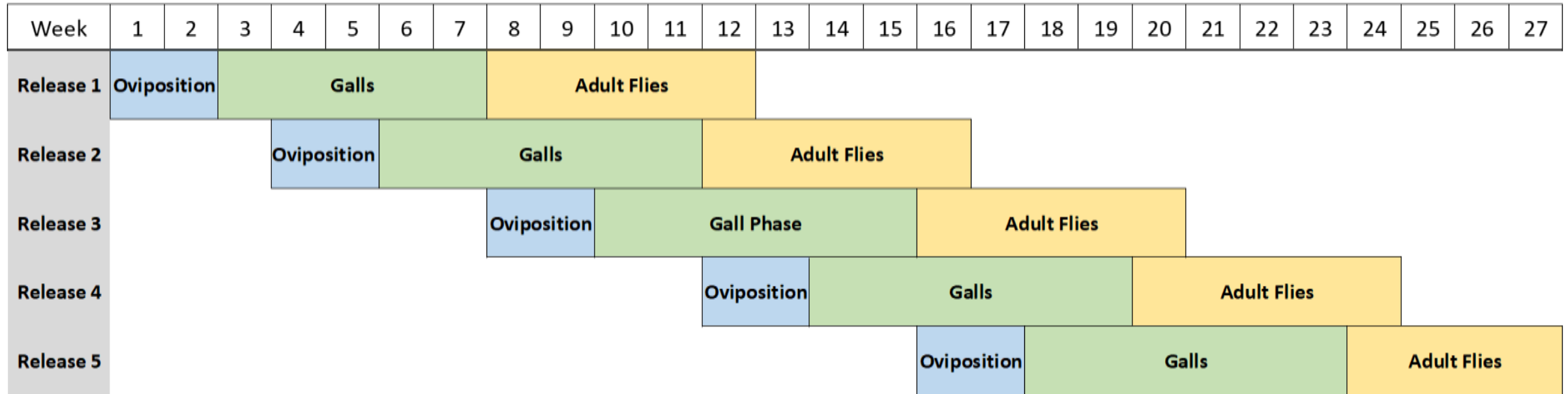


Plants have 2.7X more galls!

- Average colony output is estimated to increase 3-fold!

New strategy for field releases (2018-2019)

Single Location



- Series of five releases at each location.
- Produces overlapping generations in the field.
- Releasing flies over a longer period, increases likelihood of establishment.

Parafreutreta regalis releases 2018



- San Francisco – San Francisco Co.
The Presidio
- Fremont – Alameda Co.
Mission Peak Park
- Half Moon Bay – San Mateo Co.
Quarry Park
- Garrapata State Park – Monterey Co.
State beach scrub
- Big Sur – Monterey Co.
Glen Deven Ranch
- Laguna Beach – Santa Luis Cruz Co.
Coast Dairies State Park
- Santa Barbara – Santa Barbara Co.
Toro Canyon Park (collaborators at UCSB)

Field production – 2018 release #1

Location	County	Habitat type	Release Date	Total Galls	Galls w/ windows
The Presidio	San Francisco	Scrub	Aug, 24	36	13
Mission Peak	Alameda	Riparian	Aug, 23	13	5
Garrapata State Park	Monterey	Scrub	Aug, 27	18	7
Glen Deven (Valley)	Monterey	Riparian	Aug, 27	9	1
Glen Deven (Hillside)	Monterey	Scrub	Aug, 27	22	17
Laguna Beach	Santa Cruz	Scrub	Aug, 28	33	22
Quarry Park	San Mateo	Riparian	Aug, 28	19	1
Toro Canyon Park	Santa Barbara	Riparian	Sept, 20	1	0

Total = 151

Avg / site = 18.9

Cape-ivy leaf-mining moth



Collapsing Cap-ivy plant

Digitivalava delaireae
(Glyphipterigidae)



D. delaireae host range tests

Senecio triangularis



Take home messages

- *P. regalis* field releases in 2017 did not result in establishment.
- New, healthier fly stock was obtained from South Africa, 2018.
- 2018 field releases using multiple release strategy.
- Leaf-mining moth shows promise in lab testing, but has not been permitted for field release.

Acknowledgements

Project Funding



Technical support - USDA



Patrick Moran



Marlee Little

Cooperators



Elk Cove Inn





United States
Department of
Agriculture

Agricultural Research Service

Questions?

USDA-ARS, Western Regional Research Center, Albany CA

