

SUPPLEMENTARY MATERIALS FOR

Chemonastic stalked glands in the carnivorous rainbow plant *Byblis gigantea* LINDL. (Byblidaceae, Lamiales)

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Figure S1

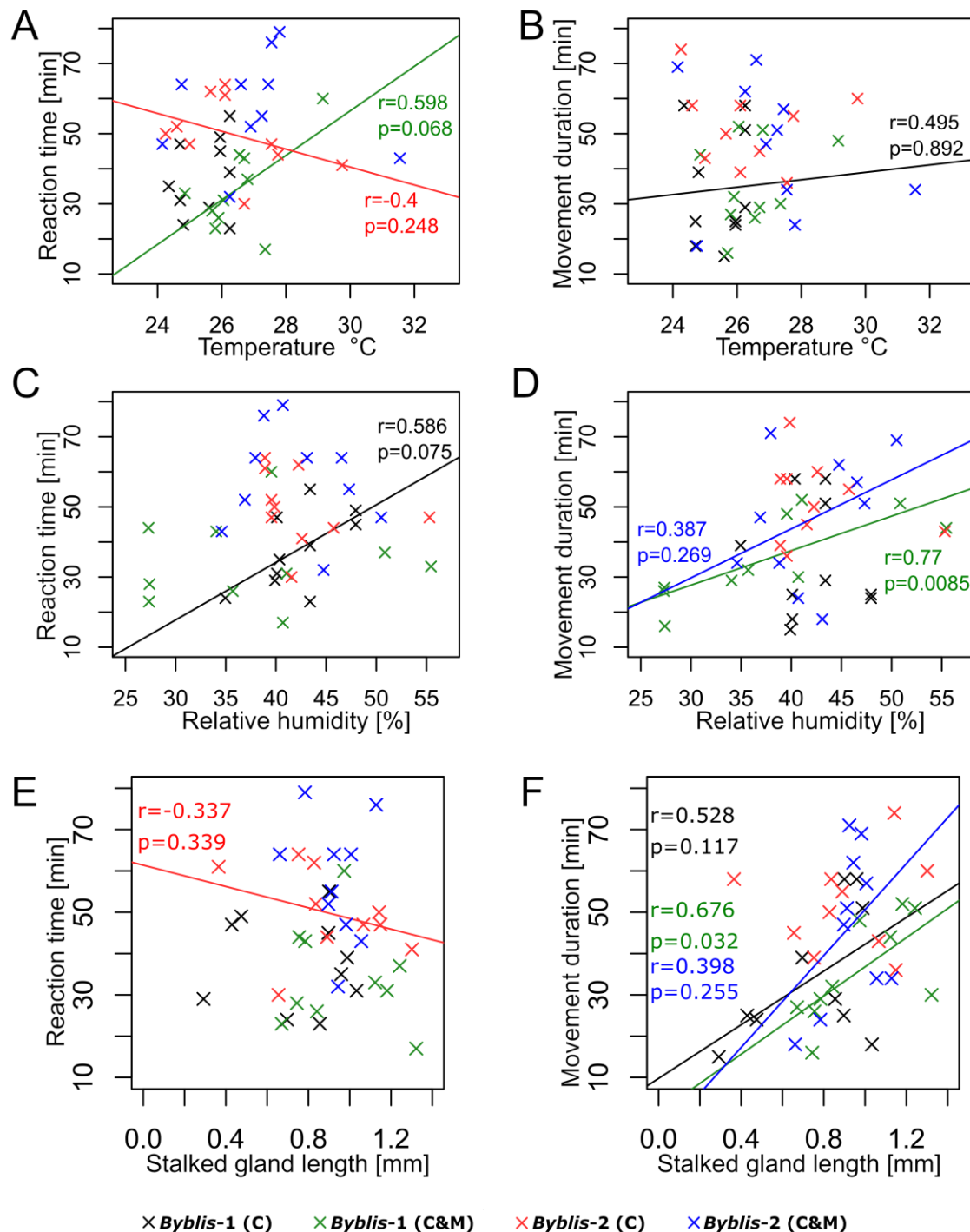


Figure S1. Shows the results from the correlation analyses between (A) reaction time and temperature, (B) movement duration and temperature, (C) reaction time and relative humidity, (D) movement duration and humidity, (E) reaction time and stalked gland length, and (F) movement duration and stalked gland length. Indicated are the two tested plants (*Byblis-1* and *Byblis-2*) and the stimulation scenarios, i.e., pure chemical (C) and combined chemical and mechanical (C&M) stimulation.

Figure S2

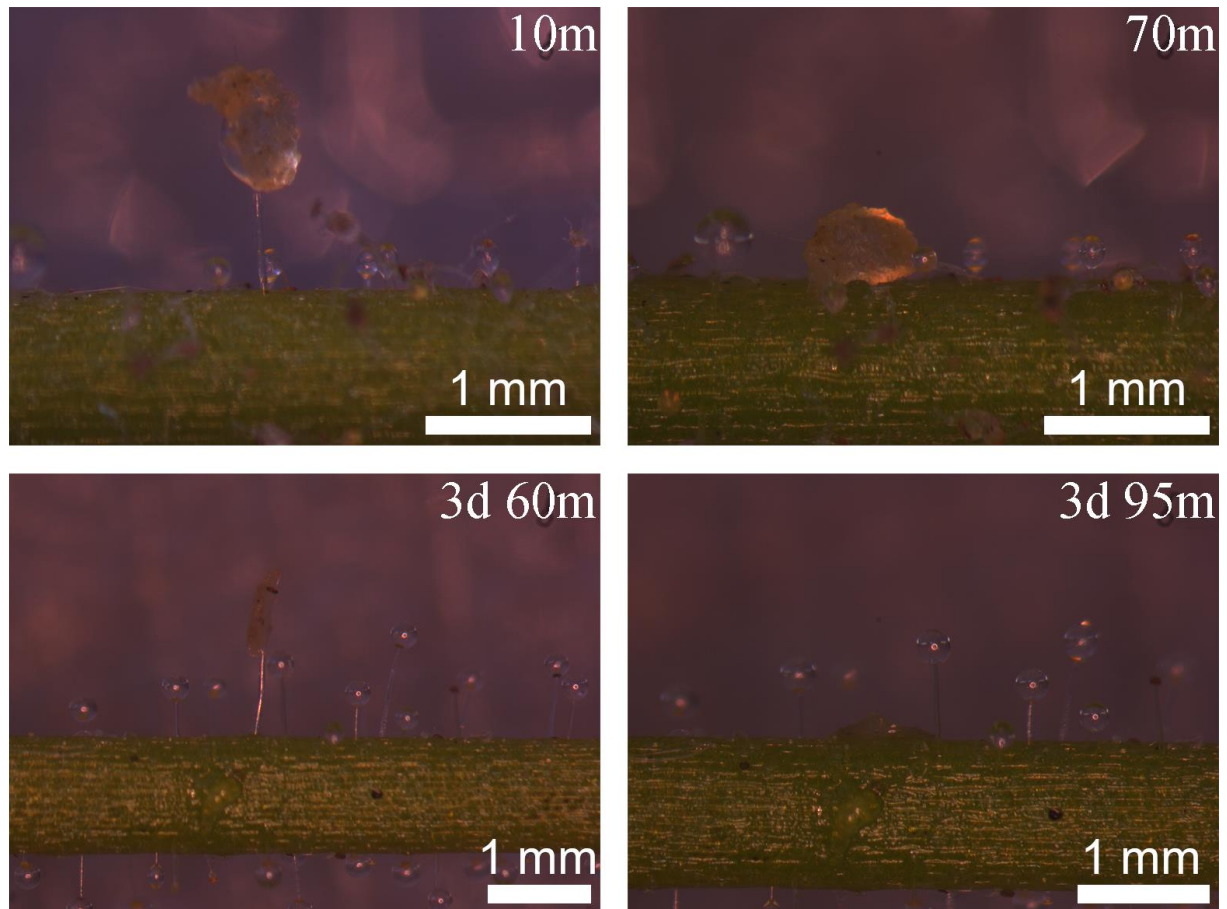


Figure S2. Shows the movement responses of stalked glands situated on the same cut-off leaf piece and stimulated with fish food flake fragments 10 minutes (upper images) and 3 days and 60 minutes (lower images) after detachment of the leaf piece.

Figure S3

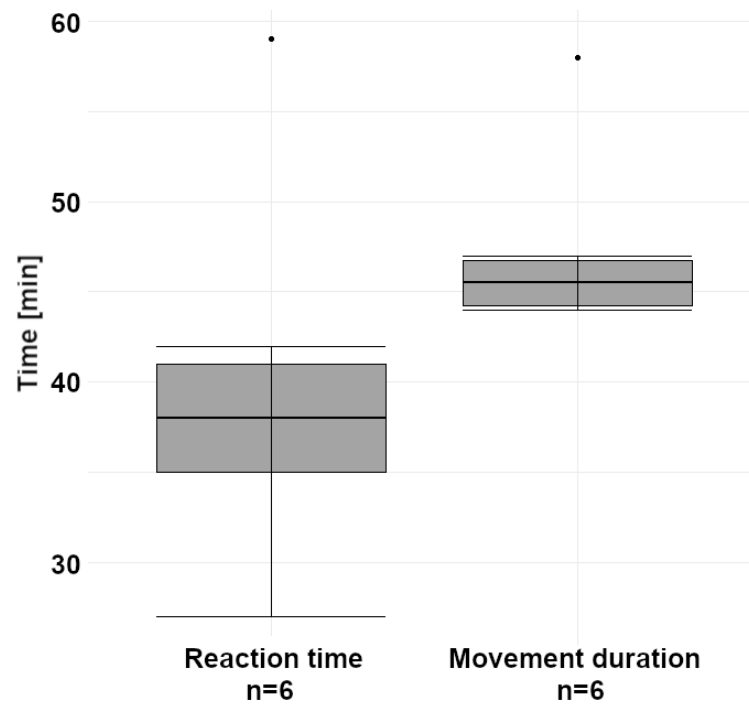


Figure S3. Shows reaction times and movement durations of stalked glands moving in paraffin oil.

Figure S4

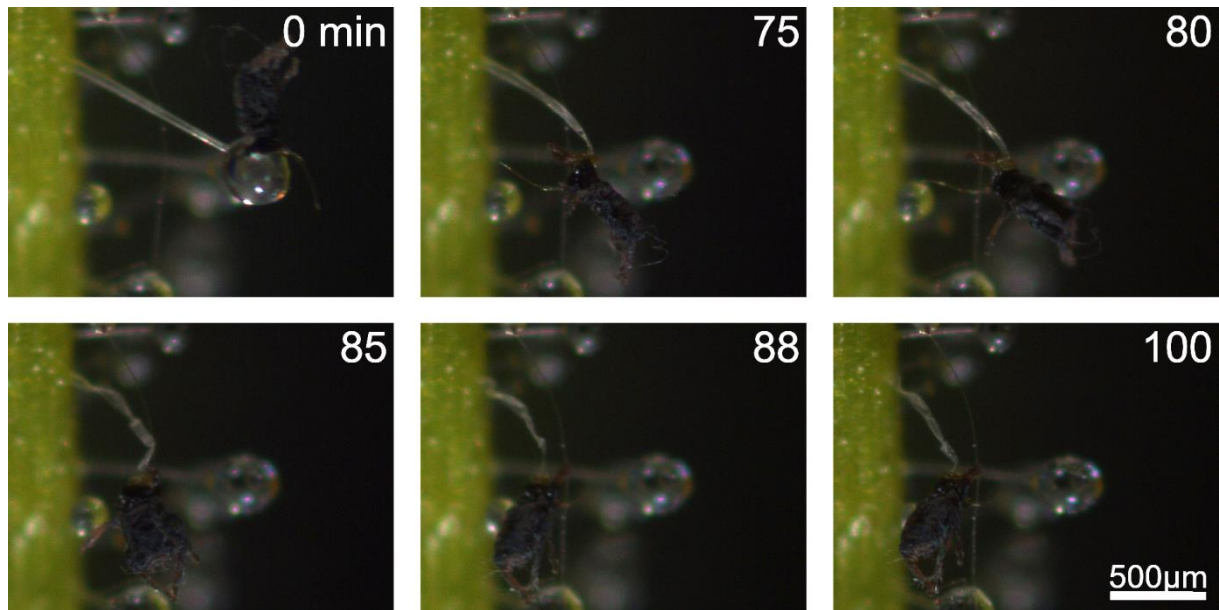


Figure S4. Shows the motion response and respective time scales [min] of a stalked gland stimulated with a dead aphid.

Figure S5

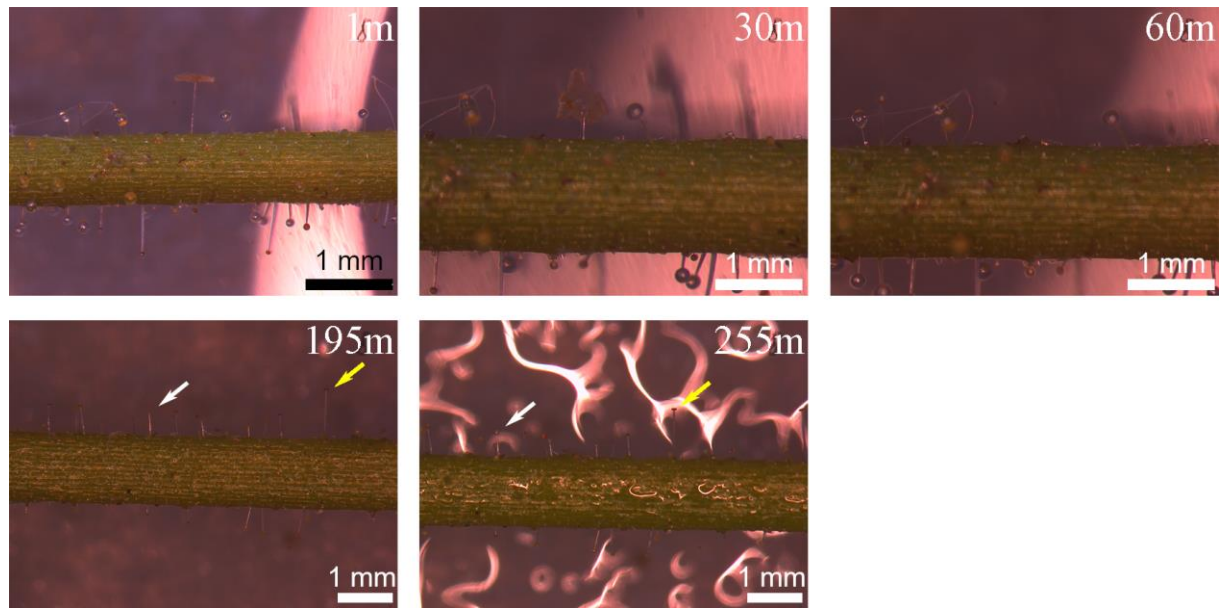


Figure S5. In the three upper images of Figure S5, the movement of a chemically stimulated stalked gland can be seen. The times indicated refer to the moment of stimulation. At minute 195, the rehydrated stalked gland (yellow arrow) and further other stalked glands (one indicated with a white arrow) are indicated. At minute 255, it can be seen that surrounding stalked glands produced glue drops, whereas the stimulated and rehydrated stalked gland did not produce glue.

Table S1

Table S1. Provides the original data for the stalked gland length measurements. US = upper surface of leaf; LS = lower surface of leaf.

Plant	Stalked gland length [mm]	Position on leaf
<i>Byblis-1</i>	0.648	US
<i>Byblis-1</i>	0.265	US
<i>Byblis-1</i>	0.462	US
<i>Byblis-1</i>	0.573	US
<i>Byblis-1</i>	0.603	LS
<i>Byblis-1</i>	0.703	LS
<i>Byblis-1</i>	0.927	LS
<i>Byblis-1</i>	0.494	LS
<i>Byblis-1</i>	1.146	US
<i>Byblis-1</i>	0.522	LS
<i>Byblis-1</i>	0.595	US
<i>Byblis-1</i>	0.935	US
<i>Byblis-1</i>	0.885	LS
<i>Byblis-1</i>	0.354	LS
<i>Byblis-1</i>	0.43	US
<i>Byblis-1</i>	0.636	US
<i>Byblis-1</i>	0.693	LS
<i>Byblis-1</i>	0.514	LS
<i>Byblis-1</i>	1.062	LS
<i>Byblis-1</i>	0.634	US
<i>Byblis-1</i>	0.347	US
<i>Byblis-1</i>	0.588	US
<i>Byblis-1</i>	0.513	US
<i>Byblis-1</i>	0.626	LS
<i>Byblis-1</i>	0.853	LS
<i>Byblis-1</i>	1.154	LS
<i>Byblis-1</i>	0.897	US
<i>Byblis-1</i>	0.475	US
<i>Byblis-1</i>	0.981	US
<i>Byblis-1</i>	0.784	LS
<i>Byblis-1</i>	0.392	LS
<i>Byblis-1</i>	0.378	LS
<i>Byblis-1</i>	0.837	LS
<i>Byblis-1</i>	0.445	LS
<i>Byblis-1</i>	0.588	LS
<i>Byblis-1</i>	0.653	US
<i>Byblis-1</i>	0.637	US
<i>Byblis-1</i>	0.757	LS
<i>Byblis-1</i>	0.573	LS
<i>Byblis-1</i>	1.11	LS

<i>Byblis</i> -1	1.132	LS
<i>Byblis</i> -1	0.347	LS
<i>Byblis</i> -1	0.536	LS
<i>Byblis</i> -1	0.901	LS
<i>Byblis</i> -1	0.354	LS
<i>Byblis</i> -1	0.862	US
<i>Byblis</i> -1	0.385	US
<i>Byblis</i> -1	0.812	US
<i>Byblis</i> -1	0.566	LS
<i>Byblis</i> -1	0.564	LS
<i>Byblis</i> -1	0.678	LS
<i>Byblis</i> -1	0.897	LS
<i>Byblis</i> -1	1.12	US
<i>Byblis</i> -1	0.951	LS
<i>Byblis</i> -1	0.46	LS
<i>Byblis</i> -1	0.574	LS
<i>Byblis</i> -1	0.579	LS
<i>Byblis</i> -1	1.124	US
<i>Byblis</i> -1	0.282	US
<i>Byblis</i> -1	0.291	US
<i>Byblis</i> -1	0.51	US
<i>Byblis</i> -1	0.99	US
<i>Byblis</i> -1	0.598	LS
<i>Byblis</i> -1	0.639	US
<i>Byblis</i> -1	0.569	US
<i>Byblis</i> -1	0.285	US
<i>Byblis</i> -1	0.365	US
<i>Byblis</i> -1	1.059	LS
<i>Byblis</i> -1	0.688	LS
<i>Byblis</i> -1	0.642	LS
<i>Byblis</i> -1	0.698	LS
<i>Byblis</i> -1	0.867	LS
<i>Byblis</i> -1	0.598	US
<i>Byblis</i> -1	0.299	US
<i>Byblis</i> -1	0.688	LS
<i>Byblis</i> -1	0.253	LS
<i>Byblis</i> -1	0.604	LS
<i>Byblis</i> -1	0.752	LS
<i>Byblis</i> -1	0.364	US
<i>Byblis</i> -1	0.421	US
<i>Byblis</i> -1	0.477	US
<i>Byblis</i> -1	0.566	LS
<i>Byblis</i> -1	0.631	LS
<i>Byblis</i> -1	0.257	US
<i>Byblis</i> -1	0.661	US
<i>Byblis</i> -1	0.5	LS
<i>Byblis</i> -1	0.737	LS

<i>Byblis-1</i>	0.309	US
<i>Byblis-1</i>	0.892	LS
<i>Byblis-1</i>	0.853	LS
<i>Byblis-1</i>	1.146	LS
<i>Byblis-1</i>	0.468	LS
<i>Byblis-1</i>	1.027	LS
<i>Byblis-1</i>	1.102	LS
<i>Byblis-1</i>	0.908	LS
<i>Byblis-1</i>	0.931	LS
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<i>Byblis-1</i>	0.646	LS
<i>Byblis-1</i>	0.613	US
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<i>Byblis-1</i>	0.691	US
<i>Byblis-1</i>	0.438	US
<i>Byblis-1</i>	0.565	LS
<i>Byblis-1</i>	0.923	LS
<i>Byblis-1</i>	0.829	LS
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<i>Byblis-2</i>	0.597	US

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<i>Byblis-2</i>	0.528	US
<i>Byblis-2</i>	1.364	LS
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<i>Byblis-2</i>	0.626	LS
<i>Byblis-2</i>	0.801	US
<i>Byblis-2</i>	0.912	US
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<i>Byblis-3</i>	0.46	US
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<i>Byblis-3</i>	0.731	LS
<i>Byblis-3</i>	1.228	US
<i>Byblis-3</i>	0.696	US
<i>Byblis-3</i>	0.735	LS
<i>Byblis-3</i>	0.47	LS
<i>Byblis-3</i>	0.445	US
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<i>Byblis-3</i>	1.161	LS
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<i>Byblis-3</i>	0.583	LS
<i>Byblis-3</i>	1.297	US
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<i>Byblis-3</i>	0.879	US
<i>Byblis-3</i>	2.361	US
<i>Byblis-3</i>	2.024	US
<i>Byblis-3</i>	2.329	US
<i>Byblis-3</i>	2.735	US
<i>Byblis-3</i>	2.157	US
<i>Byblis-3</i>	1.169	US

<i>Byblis-3</i>	0.468	US
<i>Byblis-3</i>	0.784	US
<i>Byblis-3</i>	0.837	US
<i>Byblis-3</i>	0.309	US
<i>Byblis-3</i>	0.324	US
<i>Byblis-3</i>	0.81	LS
<i>Byblis-3</i>	0.409	LS
<i>Byblis-3</i>	0.432	LS
<i>Byblis-3</i>	0.74	LS
<i>Byblis-3</i>	0.679	LS
<i>Byblis-3</i>	0.448	US
<i>Byblis-3</i>	0.686	US
<i>Byblis-3</i>	0.305	US
<i>Byblis-3</i>	0.906	LS
<i>Byblis-3</i>	0.327	LS
<i>Byblis-3</i>	0.618	LS
<i>Byblis-3</i>	0.781	LS
<i>Byblis-3</i>	1.635	LS
<i>Byblis-3</i>	0.972	LS
<i>Byblis-3</i>	0.684	US
<i>Byblis-3</i>	1.201	US

Table S2

Table S2. Provides the original data for the stalked gland density measurements. US = upper surface of leaf; LS = lower surface of leaf.

Plant number	Number of stalked glands	Position on leaf	Leaf number
1	10	US	1
1	15	LS	1
1	5	US	2
1	13	LS	2
1	12	US	3
1	20	LS	3
2	8	US	1
2	15	LS	1
2	6	US	2
2	14	LS	2
2	8	US	3
2	20	LS	3
3	17	US	1
3	21	LS	1
3	10	US	2
3	24	LS	2
3	9	US	3
3	21	LS	3
3	9	US	4
3	21	LS	4

Table S3

Table S3. Provides the original data for the stalked gland reaction times and movement durations, relative humidity and temperature, and respective stalked gland lengths in the three stimulation scenarios. C = chemical stimulation; M = mechanical stimulation; C&M = combined chemical and mechanical stimulation.

Stimulus scenario	Plant number	Leaf number	Stalked gland length [mm]	Reaction time [min]	Movement duration [min]	Relative humidity (minimum-maximum; mean) [%]	Temperature (minimum-maximum; mean) [°C]
C	1	3	0.696	24	39	33.7-36.2; 34.95	24.3-25.3; 24.8
C	1	2	0.292	29	15	38.2-41.6; 39.9	25.4-25.8; 25.6
C	1	3	1.033	31	18	38.5-41.7; 40.1	24.2-25.2; 24.7
C	1	3	0.429	47	25	38.5-41.7; 40.1	24.2-25.2; 24.7
C	1	3	0.959	35	58	37.9-42.8; 40.35	24.1-24.6; 24.35
C	1	2	0.9	55	58	42.2-44.2; 43.4	25.8-26.7; 26.25
C	1	2	0.988	39	51	42.6-44.2; 43.4	25.8-26.7; 26.25
C	1	2	0.855	23	29	42.6-44.2; 43.4	25.8-26.7; 26.25
C	1	3	0.897	45	25	47.2-48.7; 47.95	25.8-26.1; 25.95
C	1	3	0.475	49	24	47.2-48.7; 47.95	25.8-26.1; 25.95
C	2	2	0.828	62	50	39.0-45.5; 42.25	25.2-26.1; 25.65
C	2	2	0.752	64	39	37.1-40.7; 38.9	26.0-26.2; 26.1
C	2	2	0.365	61	58	37.1-40.7; 38.9	26.0-26.2; 26.1
C	2	2	0.836	52	58	38.2-40.9; 39.55	23.9-25.3; 24.6
C	2	6	1.142	50	74	38.6-41.1; 39.85	24.1-24.4; 24.25
C	2	5	1.066	47	43	54.9-55.7; 55.3	24.9-25.1; 25.0
C	2	9	0.89	44	55	45.1-46.4; 45.75	27.7-27.8; 27.75
C	2	10	1.149	47	36	39.0-40.1; 39.55	27.5-27.6; 27.55
C	2	3	0.655	30	45	40.6-42.5; 41.55	26.7-26.7; 26.7
C	2	9	1.301	41	60	40.3-44.9; 42.6	28.5-31.0; 29.75
C&M	1	2	0.755	44	26	26.9-27.7; 27.3	26.3-26.8; 26.55
C&M	1	2	0.744	28	16	27.4-27.4; 27.4	25.7-25.7; 25.7
C&M	1	3	0.671	23	27	27.3-27.4; 27.35	25.8-25.8; 25.8
C&M	1	6	0.841	26	32	34.9-36.5; 35.7	25.5-26.3; 25.9
C&M	1	6	0.784	43	29	33.7-34.4; 34.05	26.5-26.9; 26.7
C&M	1	3	1.181	31	52	40.0-42.1; 41.05	26.0-26.1; 26.05
C&M	1	7	0.973	60	48	38.5-40.6; 39.55	28.3-30.0; 29.15
C&M	1	2	1.322	17	30	40.3-41.1; 40.7	27.3-27.4; 27.35
C&M	1	2	1.123	33	44	55.4-55.5; 55.45	24.5-25.2; 24.85

C&M	1	6	1.242	37	51	50.0-51.7; 50.85	26.6-27.0; 26.8
C&M	2	2	0.897	52	47	36.2-37.6; 36.9	26.9-26.9; 26.9
C&M	2	8	0.924	64	71	37.1-38.8; 37.95	26.4-26.8; 26.6
C&M	2	2	0.982	47	69	49.0-52.0; 50.5	23.2-25.1; 24.15
C&M	2	9	0.943	32	62	44.4-45.1; 44.75	26.2-26.3; 26.25
C&M	2	9	0.661	64	18	42.7-43.5; 43.1	24.4-25.1; 24.75
C&M	2	2	1.056	43	34	29.2-40.0; 34.6	28.5-34.6; 31.55
C&M	2	8	1.006	64	57	46.5-46.6; 46.55	27.3-27.6; 27.45
C&M	2	10	0.912	55	51	47.0-47.6; 47.3	27.2-27.3; 27.25
C&M	2	10	1.128	76	34	37.9-39.7; 38.8	27.4-27.7; 27.55
C&M	2	2	0.783	79	24	40.2-41.2; 40.7	27.8-27.8; 27.8
M	1	3	0.642	no motion	no motion	32.6-34.7; 33.65	25.1-25.2; 25.15
M	1	3	0.463	no motion	no motion	32.6-34.7; 33.65	25.1-25.2; 25.15
M	1	2	0.859	no motion	no motion	31.3-31.8; 31.55	24.-24.8; 24.8
M	1	2	0.571	no motion	no motion	31.3-31.8; 31.55	24.-24.8; 24.8
M	1	2	0.647	no motion	no motion	31.3-31.8; 31.55	24.-24.8; 24.8
M	2	2	0.800	no motion	no motion	36.0-37.5; 36.75	24.7-25.2; 24.95
M	2	2	1.017	no motion	no motion	36.0-37.5; 36.75	24.7-25.2; 24.95
M	2	6	0.651	no motion	no motion	38.4-38.4; 38.4	25.0-25.1; 25.05
M	2	6	0.583	no motion	no motion	38.4-38.4; 38.4	25.0-25.1; 25.05
M	2	6	0.578	no motion	no motion	38.4-38.4; 38.4	25.0-25.1; 25.05

Table S4

Table S4. Provides the original data for the measured reaction times and movement durations in the two temperature regimes, i.e., warm (22 °C) vs. cold (12 °C).

Reaction time [min] @ 22° C	Movement duration [min] @ 22° C	Reaction time [min] @ 12° C	Movement duration [min] @ 12° C
40	56	52	68
28	44	54	73
46	42	84	53
34	55	56	89
38	51	63	92
24	42	48	103
50	63	44	82
41	58	38	

Table S5

Table S5. Provides the original data for the cellulose microfibril angle measurements on the five different stalked gland sections.

Stalk cell number	Section 1 [°]	Section 2 [°]	Section 3 [°]	Section 4 [°]	Section 5 [°]
1	42.8	38.5	32.3	31.3	21.8
2	45.2	39.7	34.8	33.9	30.6
3	41.7	36.9	37.9	33.9	27.2
4	33.5	33.7	30.6	--	--
5	41	45.6	28.3	26.1	27.9
6	38.9	37.5	35.3	35.4	26.1
7	37.2	33.8	35.8	28.7	22.6
8	--	--	--	30.7	24.7
9	38.9	36.5	30.4	33.2	25.3
10	36.2	34.9	35.4	32.3	26
11	38.5	37.8	30.5	32.6	18.4
12	37.6	39.5	36.4	34.1	23.8
13	42.9	37.8	32.7	32.1	25
14	40.2	36.8	32	31.3	27.5
15	38	37.5	38.3	33.4	23.3
16	39.4	39.3	41	38.9	26
17	52.9	44.7	43.6	40.6	28.1
18	50.3	42.3	42.9	41.6	32.5