

HIGH-CAPACITY MARKET PREPARATION FOR BURLEY

Larry Wells, Professor
T.D. Smith, Agricultural Engineer
G.B. Day IV, Research Associate

Biosystems and Agricultural Engineering
University of Kentucky



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Manual Market Preparation



Labor intensive: > 70 worker-hours/ac

Manual Market Preparation

Recent innovations have reduced labor requirement to
~ 50 worker-hours/ac



Mechanizing Market Preparation





TABWORKS grader:
2 or 3 workers
1000-1200 pls/hr
(< 0.1 ha/hr)

**Labor required for manual
market preparation labor:**
250 w-hr/ha
(100 w-hr/ac)

TABWORKS grader
50 w-hr/ha
(20 w-hr/ac)



A New Market Preparation Concept



Segmenting Cured Plants (4 in., 6 in. segments)

A New Market Preparation Concept



Leaf and stalk segments must be separated

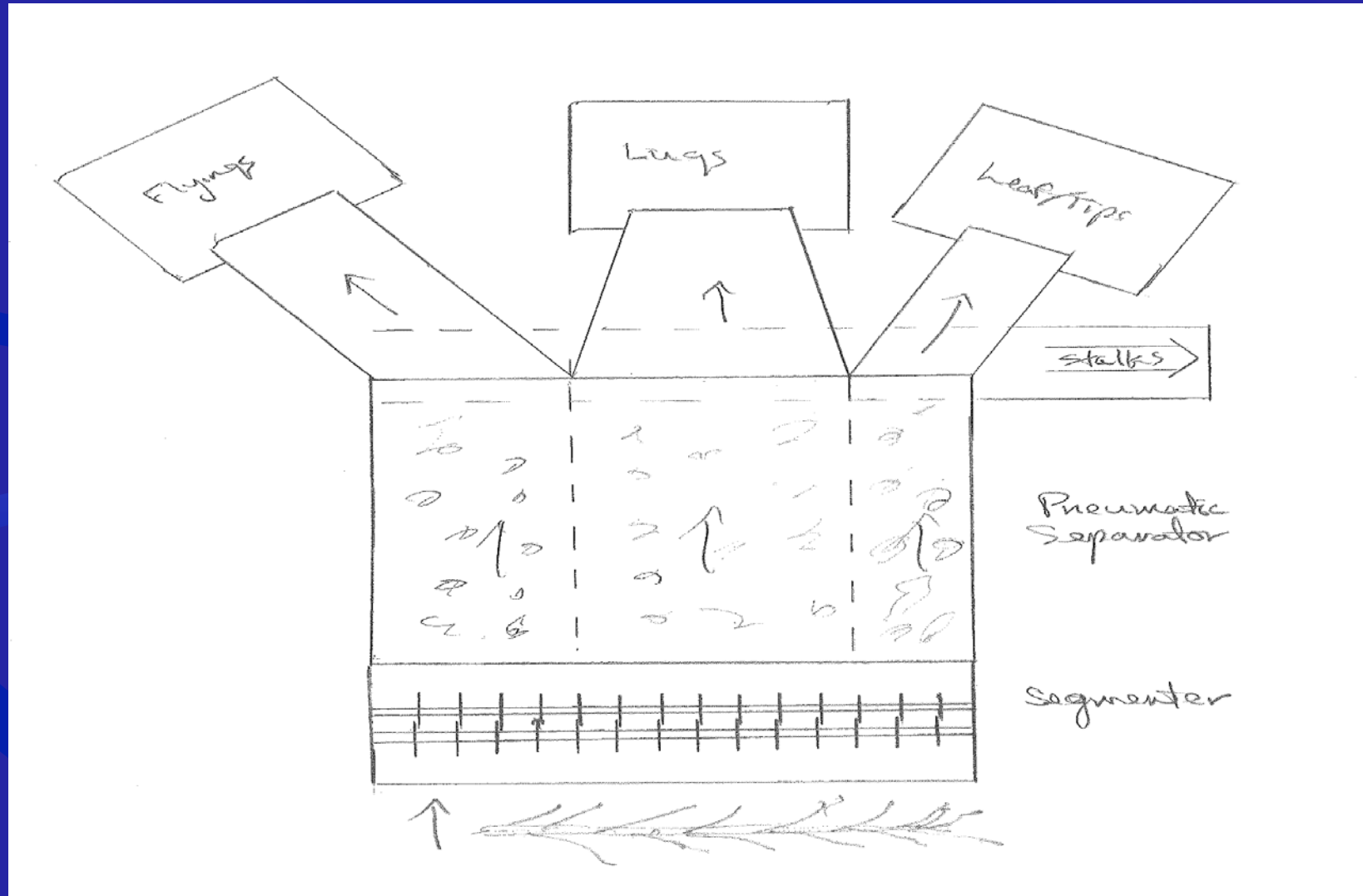


A New Market Preparation Concept



Leaf material remaining attached to stalk segments

A New Market Preparation Concept



Preliminary Investigation

Determine Leaf Mass Loss

- 4 in. and 6 in. segments
 - 50 plants segmented
- Register plants at base end
- For each segment
 - Measure mass of detached leaf segments
 - Measure mass of attached leaf segments
 - Measure midrib-to-lamina mass ratio



Leaf Mass Loss

6 inch Segments (50 plants)			
Segment	Unattached Dry Matter (g)	Attached Dry Matter (g)	Dry Matter Lost (%)
1	4.96	16.95	77.35
2	101.23	154.95	60.48
3	391.15	125.31	24.26
4	653.80	108.67	14.25
5	783.27	96.99	11.02
6	852.69	79.73	8.55
7	775.51	75.32	8.85
8	688.33	54.70	7.36
9	468.40	33.24	6.63
10	226.23	6.18	2.66
11	73.06	2.61	3.46
12	18.25	1.08	5.57
Total	5036.88	755.71	13.05

Leaf Mass Loss

4 inch Segments (50 plants)			
Segment	Unattached Dry Matter (g)	Attached Dry Matter (g)	Dry Matter Lost (%)
1	4.21	6.17	59.44
2	10.02	54.03	84.35
3	109.39	68.87	38.63
4	263.74	62.43	19.14
5	369.36	55.92	13.15
6	451.81	50.85	10.12
7	545.66	49.80	8.36
8	598.78	47.23	7.31
9	611.36	44.66	6.81
10	588.42	40.00	6.37
11	526.96	28.04	5.05
12	429.98	15.53	3.49
13	293.10	6.22	2.08
14	143.70	2.74	1.87
15	57.08	0.17	0.29
16	25.03	0.00	0.00
Total	5028.59	532.66	9.58

Leaf Mass Loss: Midrib vs Lamina



Leaf Mass Loss: Midrib vs Lamina

6 inch Segments (10 plants)				
Segment	Midrib Dry Matter (g)	Midrib Percent	Lamina Dry Matter (g)	Lamina Percent
1	1.24	87.9	0.17	12.1
2	20.02	78.5	5.49	21.5
3	18.24	76.7	5.54	23.3
4	13.11	73.7	4.39	26.3
5	12.33	72.8	4.89	27.2
6	7.45	72.1	2.88	27.9
7	7.93	63.9	4.48	36.1
8	3.57	58.1	2.57	41.9
9	0.56	42.7	0.75	57.3
Total	84.45	73.0	31.16	27.0



Leaf Mass Loss: Midrib vs Lamina

4 inch Segments (10 plants)				
Segment	Midrib Dry Matter (g)	Midrib Percent	Lamina Dry Matter (g)	Lamina Percent
1	1.14	92.7	0.09	7.3
2	6.91	81.7	1.55	18.3
3	10.58	77.2	3.12	22.8
4	11.47	78.8	3.08	21.2
5	8.33	76.3	2.59	23.7
6	7.48	70.9	3.07	29.1
7	6.50	73.8	2.31	26.2
8	6.60	69.3	2.92	30.7
9	4.83	61.5	3.03	38.5
10	3.46	62.5	2.08	37.5
11	2.33	58.5	1.65	41.5
12	0.63	54.8	0.52	45.2
13	0.84	50.6	0.82	49.4
14	1.47	47.0	0.53	53.0
Total	71.57	72.3	27.36	27.7

Can we bale segmented leaf?



Plants chopped into 2.5 in. pieces using a forage chopper.



Can we bale segmented leaf?



Large baler modified to use 7 wires vs conventional 5 wires.



DESIGN GOALS

1. Feeding Plants

- a. Two workers feeding @ 1.5 plants/sec
- b. Mechanical feeding @ 3.0 plants/sec

2. Required Labor

- a. Two workers feeding + two workers baling and supplying feeders
- b. Three workers with mechanical feeding

3. Operational Efficiency

- a. Assume 75%

4. Operational Capacity

(assuming 7,000 plants/ac; 2,500 lb/ac; 600 lb/bale)

- a. Manual feeding..... 0.58 ac/hr (2.42 bale/hr), 4.63 ac/day (19.29 bales/day)
- b. Mechanical feeding... 1.16 ac/hr (4.83 bales/hr), 9.28 ac/day (38.67 bales/day)



POTENTIAL LABOR REDUCTION

- **Manual Feeding**
 - 6.9 wkr-hrs/ac..... 86 to 90 % reduction
- **Mechanical Feeding**
 - 2.6 wkr-hrs/ac..... 95 to 96 % reduction



TESTING AND EVALUATION IN 2012

- **Jan- Feb.**
 - Process approximately 20,000 lb for evaluation in stemery
- **March- September**
 - Refine prototype for on-farm testing
- **October- January**
 - On-farm testing
 - Determine operational capacity and efficiency
 - Extensive evaluation of segmented for manufacturing



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Questions?

