Disclaimer : Please note that the comments and observations are my personal opinions and do not necessarily reflect the industries I operate in.

Session 2:
Defoliation and Harvesting

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Introduction

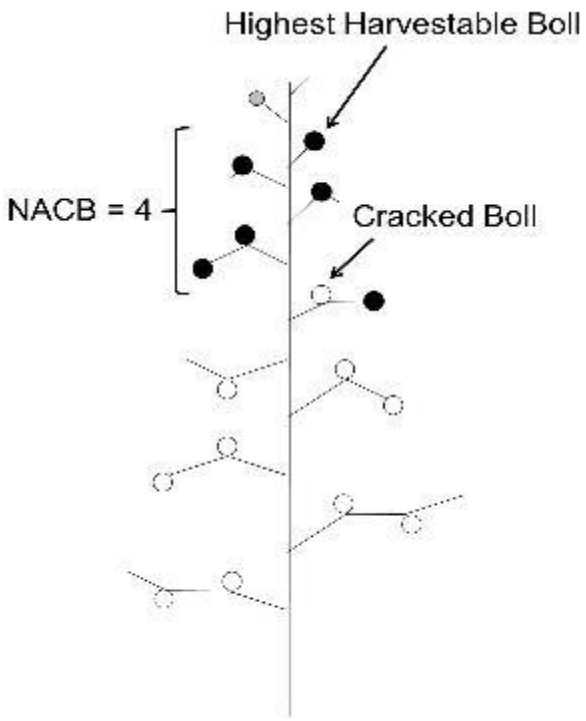
Defoliation is the application of chemicals to encourage or force cotton leaves to drop from the plant in preparation for mechanical (spindle & stripper) harvesting.

Cotton crops are generally considered ready for defoliation at either 60% open bolls, or four nodes above cracked boll (4 NACB).

This application is often a combination of:

- Defoliants (thidiazuron, diuron)
- Boll Openers (ethephon)
- Crop Oil.

Applied either by air or spray boom



Percent Open Boll: 10/16 = 62.5%

Immature ⟷ Mature

Bolls that are mature have seed coats that are turning brown

Defoliation

Aim to have a ripe crop as well as minimal leaf presence

Poor defoliation is common.

While cotton plants are naturally perennial shrubs, commercially, they are grown and managed as annual crops, meaning they are sown, harvested, and removed each year.

Current Cotton varieties are more indeterminate

- ✓ Nutrition (Nitrogen, water)
- ✓ defoliant product?
- ✓ timing?
- ✓ passages?
- ✓ mixture?
- ✓ is it worth waiting for the top bolls?
- ✓ pre harvest agronomy?
- ✓ regrowth suppression?
- ✓ is our knowledge adequate?
- ✓ are products appropriate for our quality requirements?

Alternative Considerations

1. Application of low rate of Thidazuron (TDZ) at 6 to 8 NACB followed by normal defoliation processes.

This application of TDZ will induce leaf drop by changing the hormone status in the crop.

This will allow light to enter the canopy and help to mature bolls.

This theory of inducing leaf drop was initially proposed to control late season outbreaks of pests.

Alternative Considerations

2. Application of low rate of Ethephon at 6 to 8 NACB followed by normal defoliation processes.

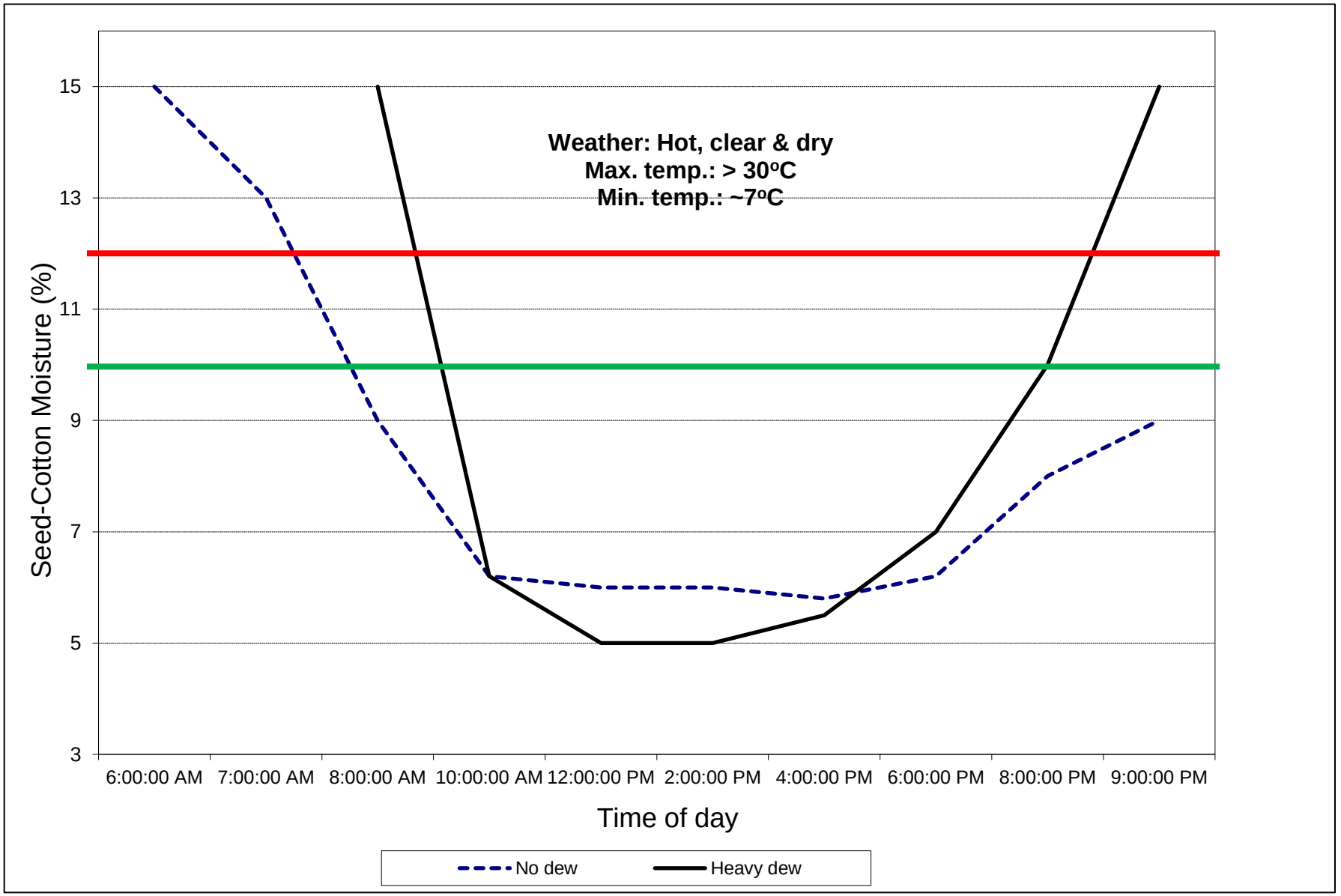
This application will knock off the top unopened bolls

3. Full defoliation at 6 to 8 NACB.

Moisture

- Control of moisture during harvesting & storage is critical in maintaining fibre and cottonseed quality.
- Generally accepted that seed cotton should not be harvested ≤12%.
- As the size and spread of the cotton crop increases the pressure increases on growers/contractors to harvest as soon as possible.
- Newer harvesters have greater horsepower, traction and fan capacity which enables them to harvest cotton when traditionally field conditions would have made harvesting difficult.
- Use of well calibrated moisture meters is essential for monitoring cotton moisture during harvesting.
- As the crop size increases some modules may be left over to the following season.

Moisture over a day – when to harvest



Consequence of moisture

- Normal (≤12%) production rate 50 bale/hour
- For >12% moisture 20% reduction in production.
- For 14% moisture 40% reduction in production.
- Increased gas usage
- Increased labour costs
- Blockages and chokes
- Rib fires
- Quality downgrades
- Seed Quality

Harvesting Methods

Harvesting Decisions

Who decides?

- Agronomist
- Grower
- Contractor

Pressures

Starts, stops - daily, after rain

Baler Revolution

The John Deere harvester, with on board module building has been taken up very quickly by most of the cotton industry.

The reasons are obvious

- can harvest cotton virtually non-stop
- very productive
- requires less labour and capital
- dispenses with the requirement of module building.

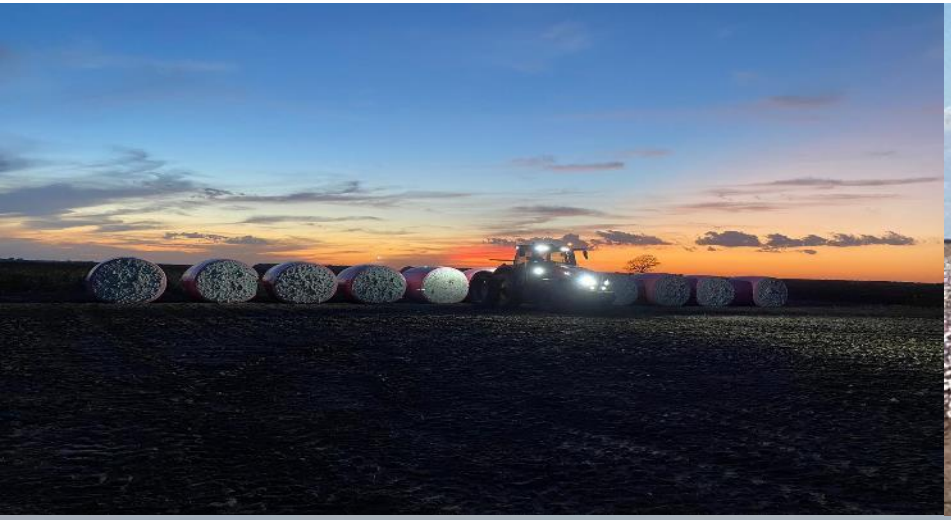
But at what cost?

Harvesting Video

https://www.youtube.com/watch?v=BkpIG_vo_qQ

Staging

To avoid variability in fibre quality and processing performance modules should be staged, transported, and ginned in the sequence that they were harvested.



Choice of Plastic Wrap

Take into consideration the following:

- duration of storage (both on farm and at the gin)
- mode (flat bed or speciality trailers) and
- distance of transportation

This being especially important as the quality of the RM wrap plays an important role in preserving fibre quality and minimising contamination.

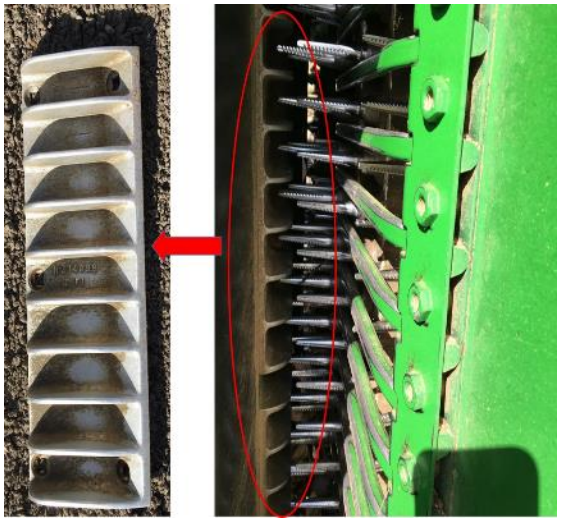
Mode of Transportation

Spindle

Harvester Setup and Process

Modern machines harvest cotton at great rates – 20-to-30-ton seed cotton/hour

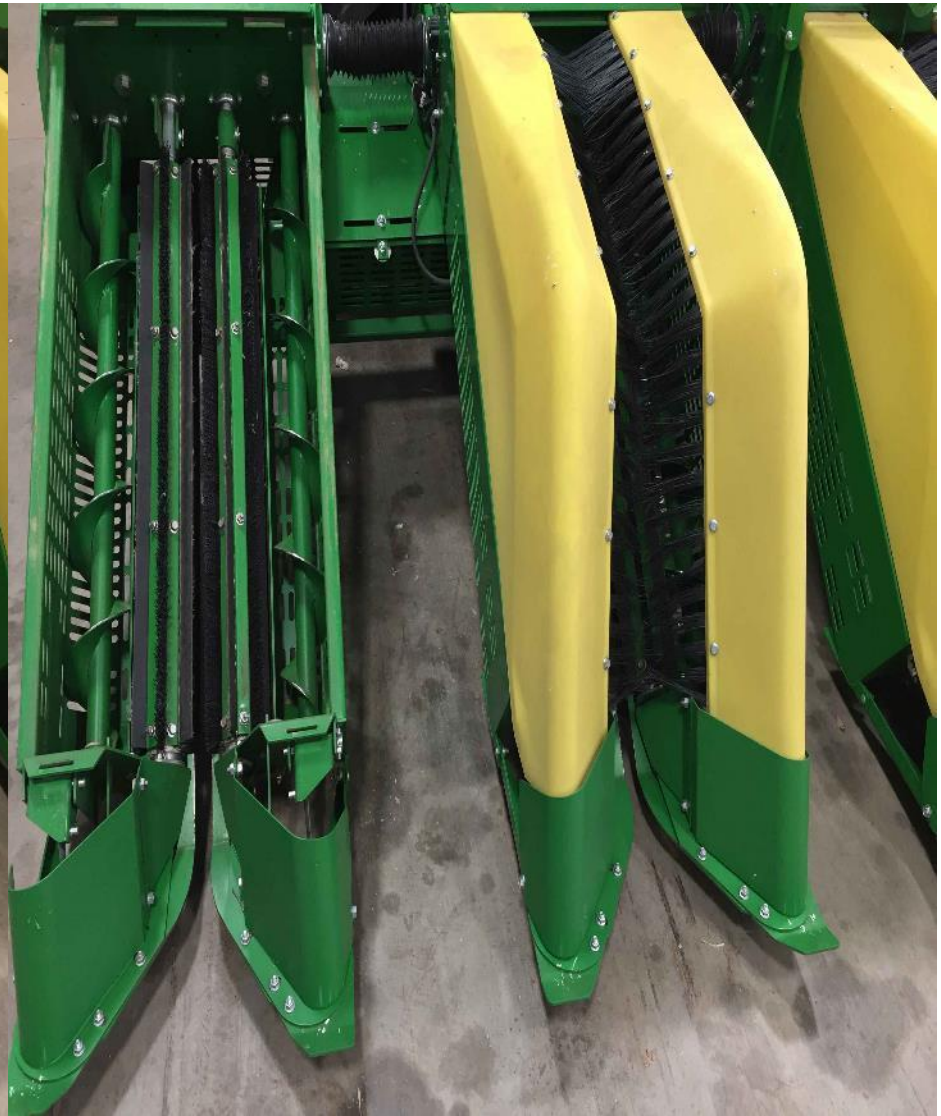
- Maintenance
- Spindle condition
- Settings
- Pressure doors
- Spindle Tip Clearance
- Scrapping Plates
- Ground /Spindle Speed
- Additives in water



HVI fibre properties and visual grade

Variable	+b	Rd	UHML mm	UI %	SFI %	Str g/tex	El %	Mic	Grade
Speed						p= 0.023 2.29%			
Scrap plates	p= 0.000 14.09%	p= 0.000 8.22%	p= 0.001 6.19%		p= 0.014 3.23%	p= 0.001 4.77%	p= 0.000 10.71%	p=0.000 27.16%	p= 0.000 26.39%
Front	p= 0.019 2.09%	p= 0.020 2.19%	p= 0.022 2.68%			P= 0.027 2.12%		p= 0.001 4.44%	p= 0.000 3.21%
Back									p= 0.009 1.73%
Scrap*Front	p= 0.000 7.90%	p= 0.000 9.67%		p= 0.020 2.76%	p= 0.018 2.98%	p= 0.000 7.26%			p= 0.000 6.29%
Scrap*Back	p= 0.000 5.45%					P= 0.002 4.42%			p= 0.000 4.12%
Speed*Scrap* Front		p= 0.000 7.00%							p=0.000 4.12%
Front*Back							p= 0.010 3.03%	p= 0.029 1.76%	
Speed*Front									p= 0.000 7.55%
Speed*Front* Back									p= 0.032 1.16%

Stripper



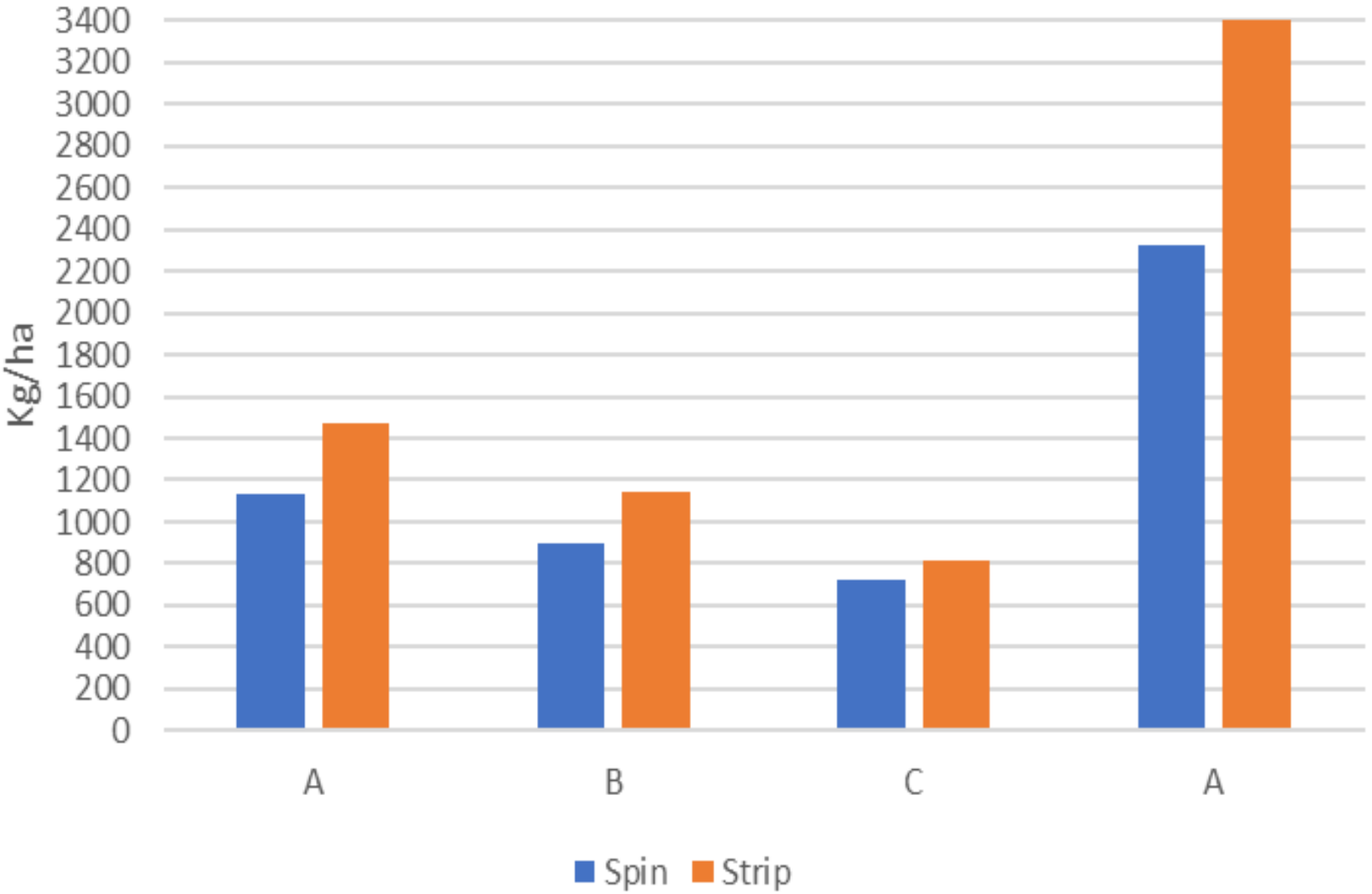
Harvesting Efficiency

Harvesting Efficiency (kg ha^{-1})

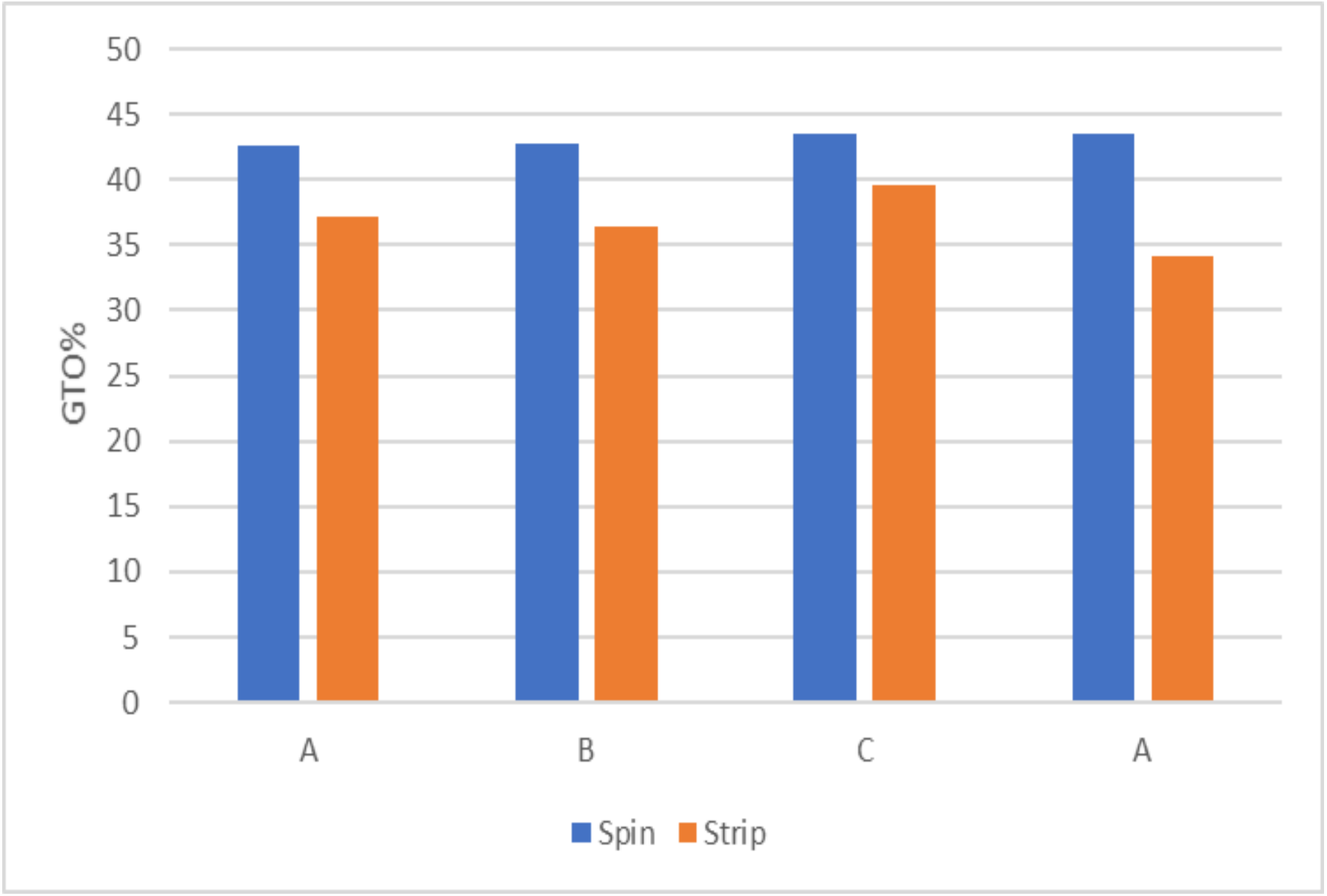
	Farm A		Farm B		Farm C	
Param	Spin	Strip	Spin	Strip	Spin	Strip
Plant	98.0	3.5	78.9	0	95.9	0
Ground	74.0	19.5	143.1	53.4	84.0	36.8
Total	172.0	23.0	222.0	53.4	179.8	36.8

Examples of Harvest Loss (Spindle Ground LHS, Spindle Plant MIDDLE, Stripper Ground RHS)

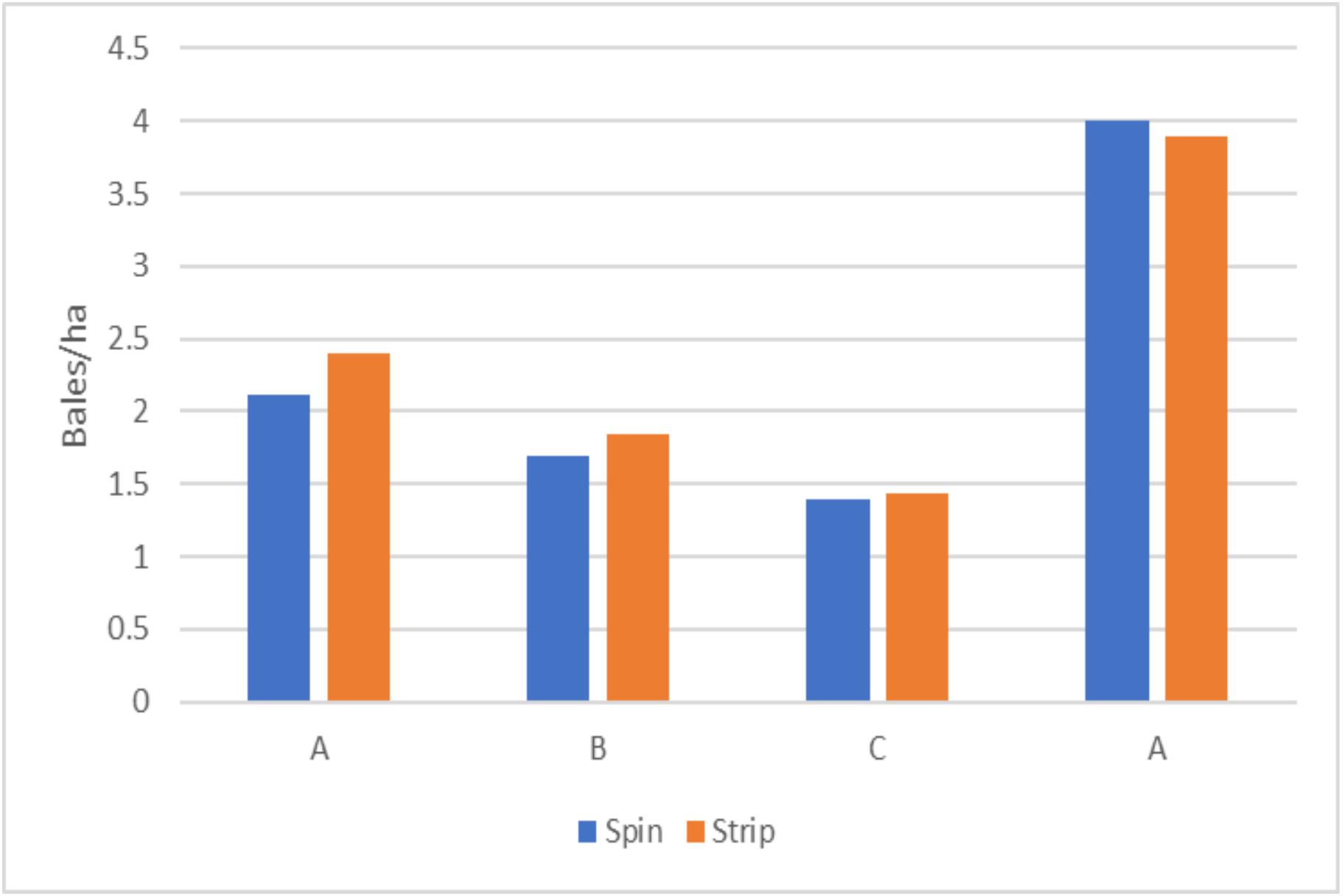
Yield


3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Kg/ha
A
B
C
A
Spin
Strip

Lint Turn Out



Bales ha^{-1}



Fibre Quality (HVI)

	Farm A		Farm B		Farm C		Farm A	
Param	Spin	Strip	Spin	Strip	Spin	Strip	Spin	Strip
Length	1.06	1.05	1.05	1.05	1.10	1.09	1.15	1.15
UI%	79	80	81	81	81	80	82	82
Strength	28.3	28.2	30.4	30.4	30.6	30.5	32.8	33.2
Mic	4.65	4.60	4.88	4.86	4.78	4.78	5.07	5.08
Rd	82.3	83.0	81.1	82.2	83.2	83.4	80.9	81.3
+b	9.0	9.6	9.5	10.1	8.7	9.3	7.4	7.8
C Grade	11	11	11	11	11	11	31	21
% Area	0.09	0.11	0.09	0.11	0.09	0.16	0.22	0.32
T Grade	1	1	2	2	2	2	3	3

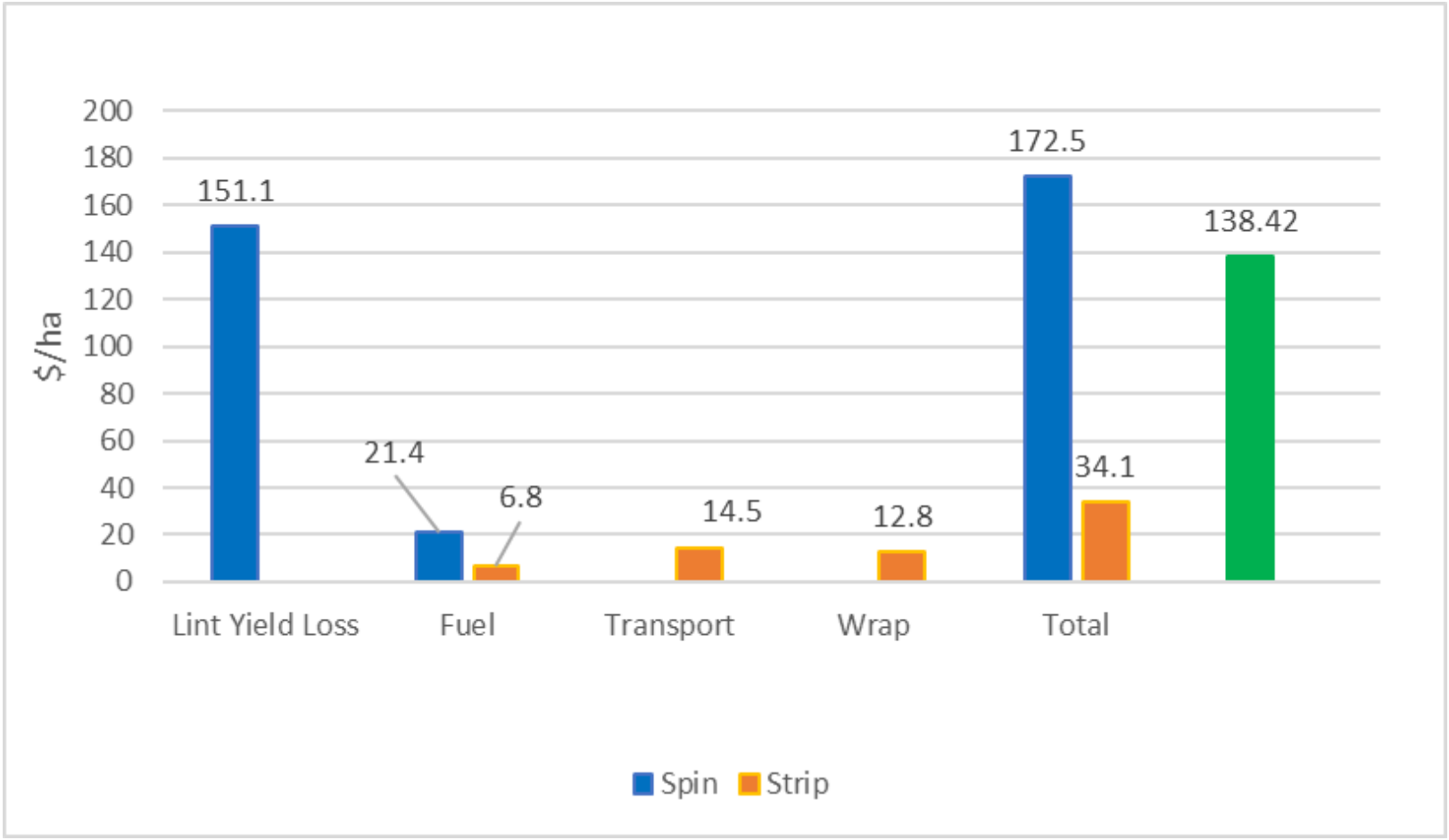
Fibre Quality (AFIS)

	Farm A		Farm B	
Param	Spin	Strip	Spin	Strip
Fine	205	206	176	175
Mat	0.85	0.85	0.87	0.86
Neps/g	208	233	184	199
SCN/g	27	31	19	15
SFC(w)	13.0	13.5	10.1	10.2

Seed Quality (% VMD)

	Farm A		Farm B		Farm C		Farm A	
Desig	Spin	Strip	Spin	Strip	Spin	Strip	Spin	Strip
No	94	93			*	*	75	80
Pin					*	*	15	12
Minor	1	1			*	*	4	3
Major	5	6			*	*	6	5
Total	6	7	51	58	*	*	25	20

Benefits



Assumptions- Bale A$ 500; Diesel $1/l, Wrap $51/RM, Transport $58/RM

However

Thank you

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