Changes in Resource Partitioning After 30 Years of Cotton Production

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Acknowledgements

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Increased cotton productivity

Genetics × Environment × Management

1990 → 2020

Selective breeding for increased number of fibers per ovule, increased number of seeds per boll, increased number of bolls per plant, increased boll weight

Increased resistance to biotic/abiotic stresses

Optimized plant architecture (compact, foliage angle)

Adaptability to wide range of of environmental conditions

Adoption of new technology/management strategies

Change in the nutrient allocation

Overview of the Study

1. 2018-2020 at New Deal, TX
2. Cultivars:

   Deltapine (DP) 1646, FiberMax (FM) 958, Paymaster (PM) HS26

3. Measurements:

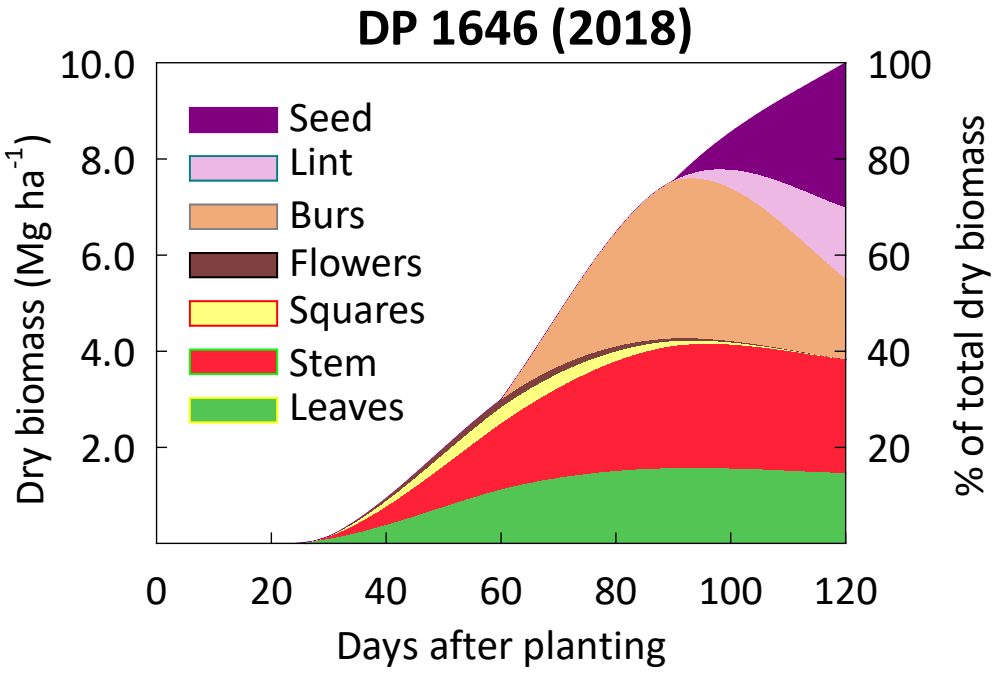
   Yield and biomass production

   Uptake and partitioning of N, P, K, Ca, Mg, and S to different organs

Key Findings

1. Bigger resource pool and greater efficiency in partitioning of dry matter towards fruit development

2. Efficient resource partitioning was reflected in greater lint yield of FM 958 and DP 1646 than older cultivars



Lint yield (kg ha^{-1})		
Previous report	**Current report**	
1990	*2018*	*2019*
839	**1457 b** (PM HS26)	**758 b** (PM HS26)
	1744 a (FM 958)	**783 ab** (FM 958)
	1709 a (DP 1646)	**969 a** (DP 1646)

Key Findings

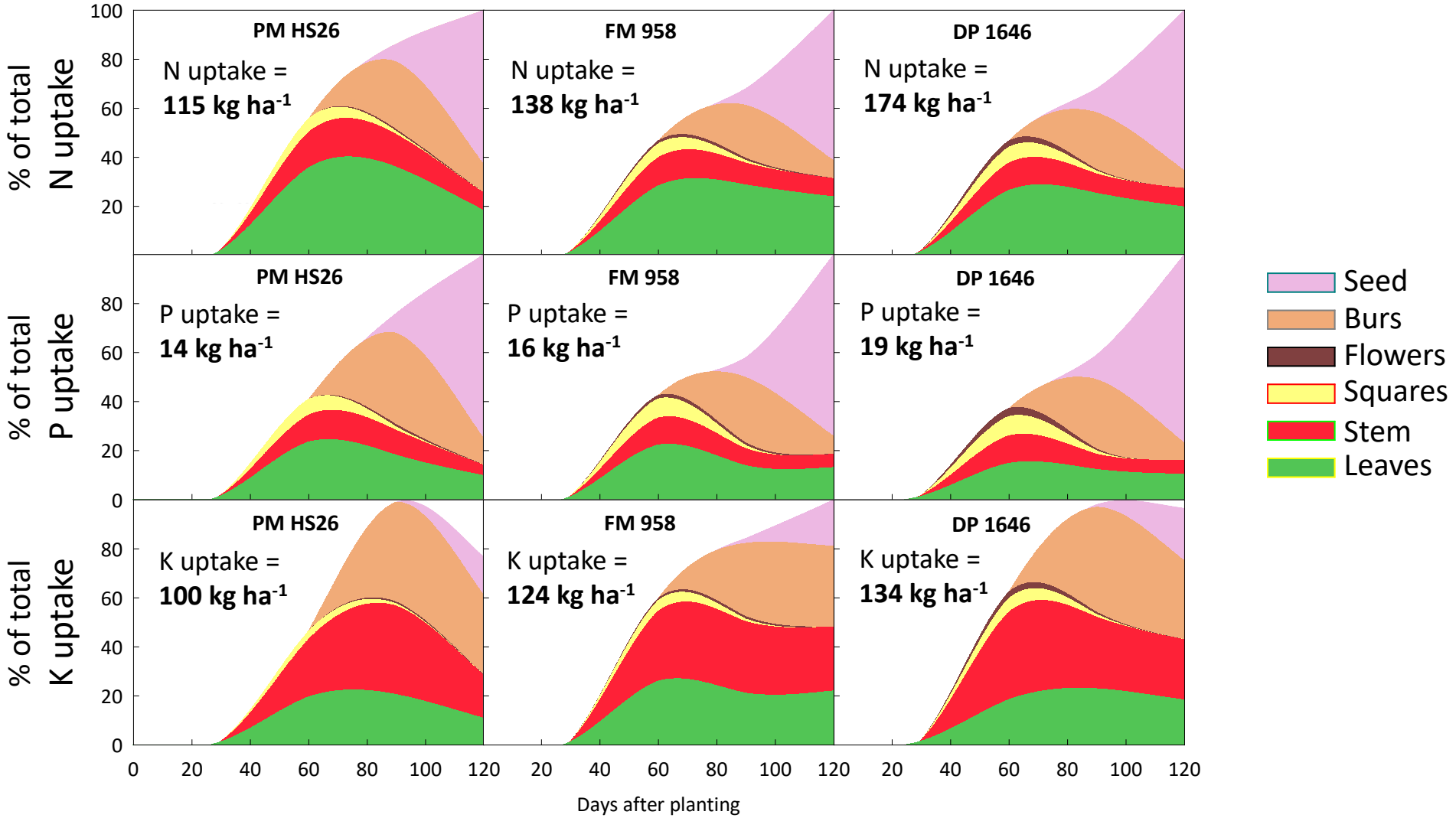
3. Newer cultivars have better efficiency in using and remobilizing macronutrients to produce more lint yield

Nutrient	% increase (from the 1990s report to current report)	
	Total uptake	*Lint yield produced/unit of nutrient uptake*
N	**36%**	**66%**
P	**12%**	**88%**
K	**26%**	**64%**
S	**48%**	**30%**
Ca	**44%**	**44%**
Mg	**47%**	**40%**

Note: current report based on the performance of DP 1646 under favorable growing environment

Key Findings

4. Fruits of modern cultivars were more nutrient-dense than previously



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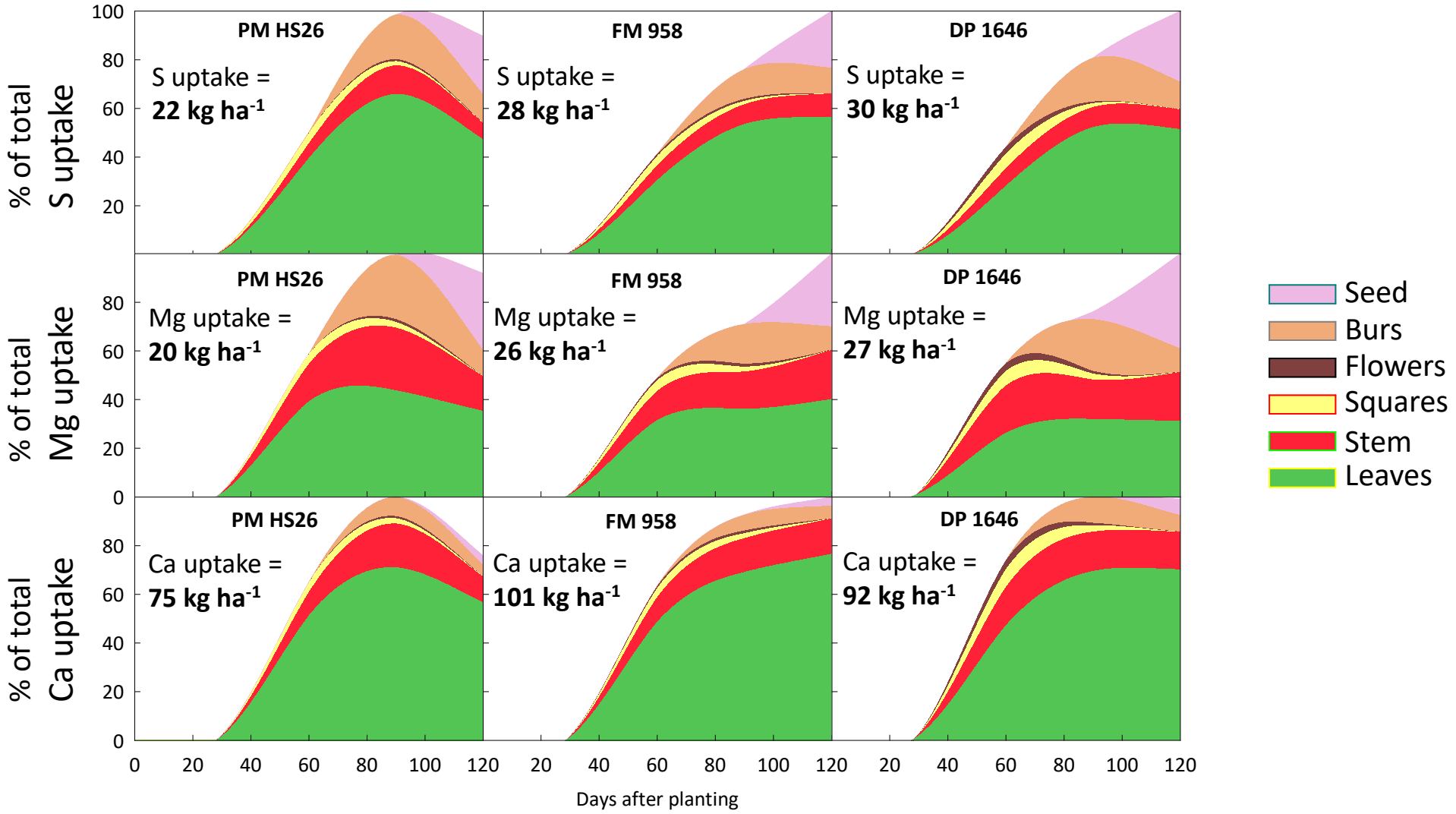

Conclusions

1. Updated information - basis for optimizing nutrient application
2. Nutrient recommendations adjustments to the shift in cultivar growth characteristics
3. Further improvements in yield and application efficiency of fertilizers

Published article:

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