



UNIVERSITY OF COPENHAGEN



Identification of biomarkers for selection of high biomass yield and quality in winter wheat varieties

BIOVALUE SPIR

Presentation for BIO-VALUE group meeting

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BIO-VALUE Project group 1 - BIOMASS

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Introduction

http://www.uky.edu/Ag/GrainCrops/ID125Wheat_Management_Kentucky.html

The aim

Identification of biomarkers for selection of wheat cultivars with increased straw yield and quality – high value products (cellulosic ethanol or other sugar products)

Focus

- Accessibility and composition of the biomass sugars
- Grain yield maintained
- Efficient and sustainable wheat breeding strategy

Literature

Jensen et al. 2011 & Lindedam 2012 -> exist wheat cultivar variation in relation to sugar composition in yellow biomass

Prospect is to find biomarkers for genes that regulate this variations

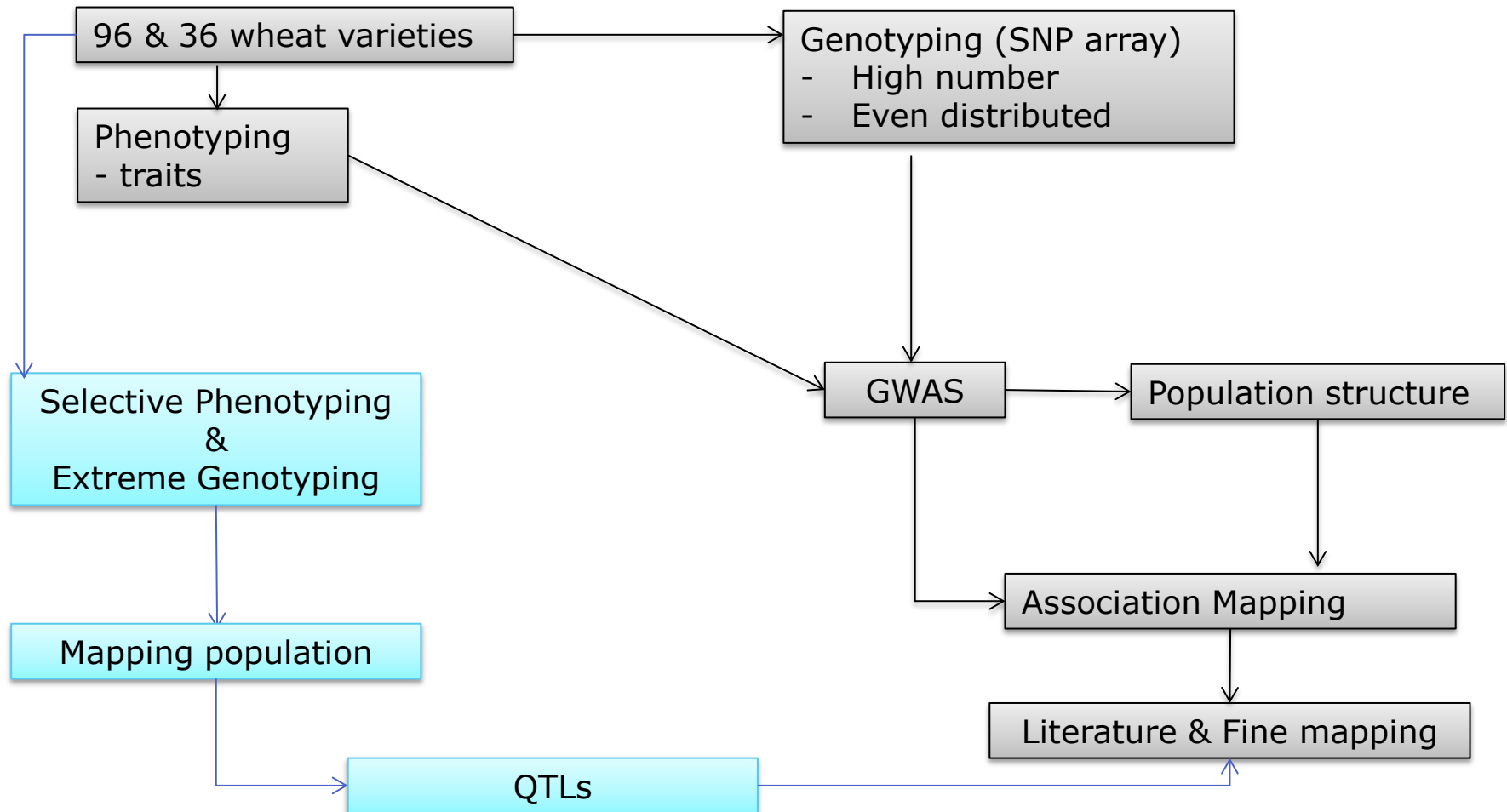
Experimental designs

36 varieties (3 replicates of all data)

96 varieties (2 replicates of all data and 4 of some data)

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Methodical strategy



Traits of interest

Morphology

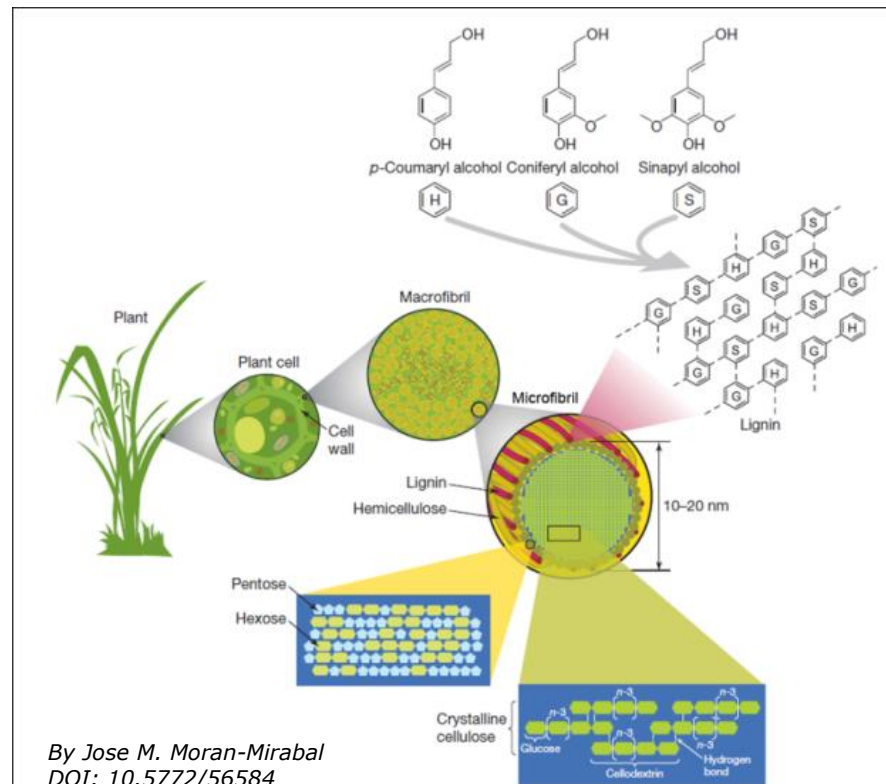
- Biomass yield [hkg/ha]
- Grain yield [hkg/ha]
- Harvest index
- Lodging degree
- Straw height
- Septoria degree



<http://ksoo.com/corn-soybeans-suffer-in-drought-year-winter-wheat-seedlings-down/>

Biochemical

- Saccharification
- Compositional analysis of the cell wall
- Compositional analysis of total sample
- Total carbon and nitrogen content
- Multielement analysis

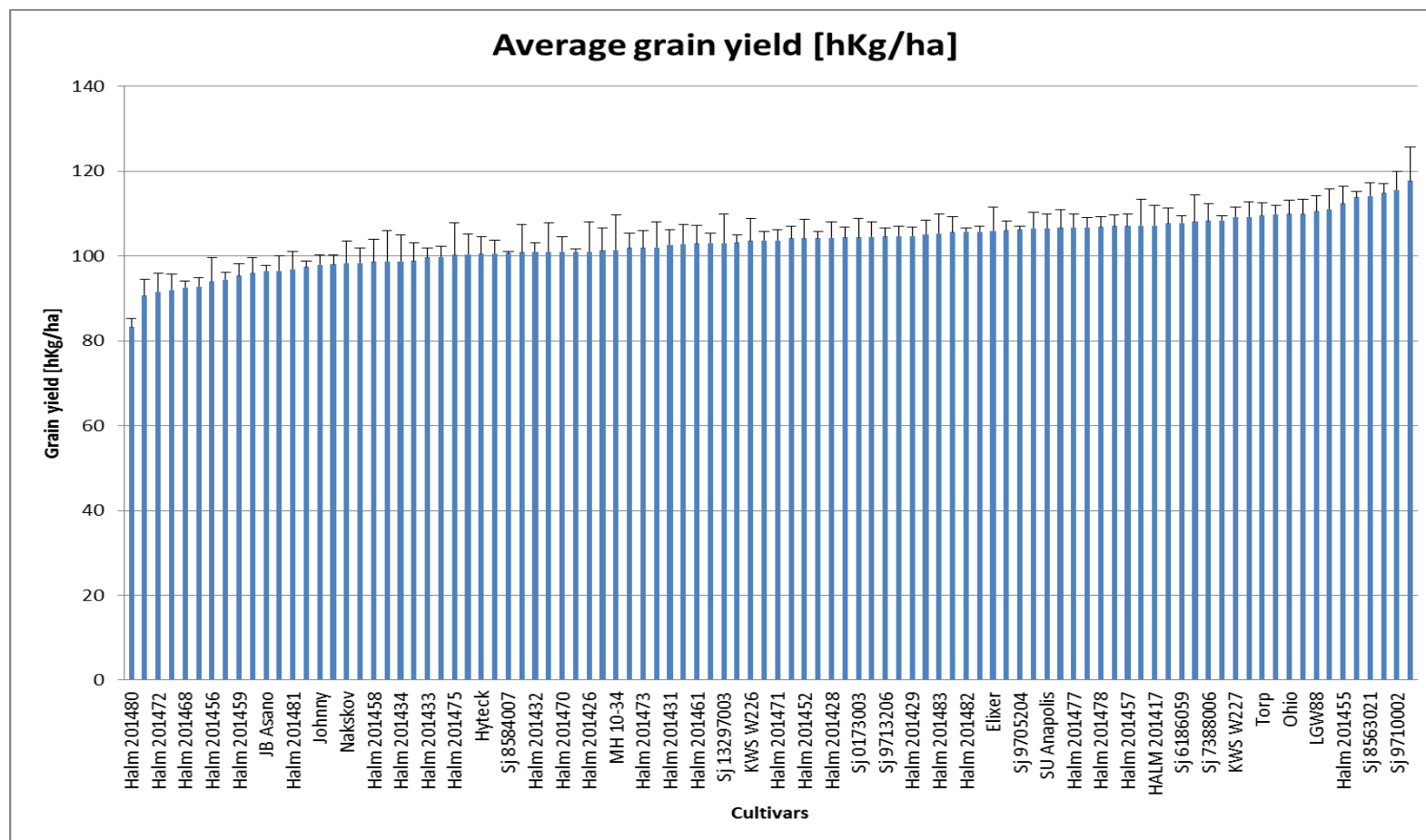


By Jose M. Moran-Mirabal
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Status and future work

Tasks	Finished	In progress	Waiting
Phenotyping		X	
Biomass yield	X		
Grain yield	X		
Harvest index	X		
Lodging	X		
Straw height	X		
Septoria	X		
Saccharification		X	
Compositional analysis cell wall		X	
Compositional analysis total sample			X
Total C and N level			X
Multi-element analysis			X
Genotyping			X
GWAS			X
Crossing experiment			X
SNP marker identification			X
Gene mapping			X

Results– Grain yield variation

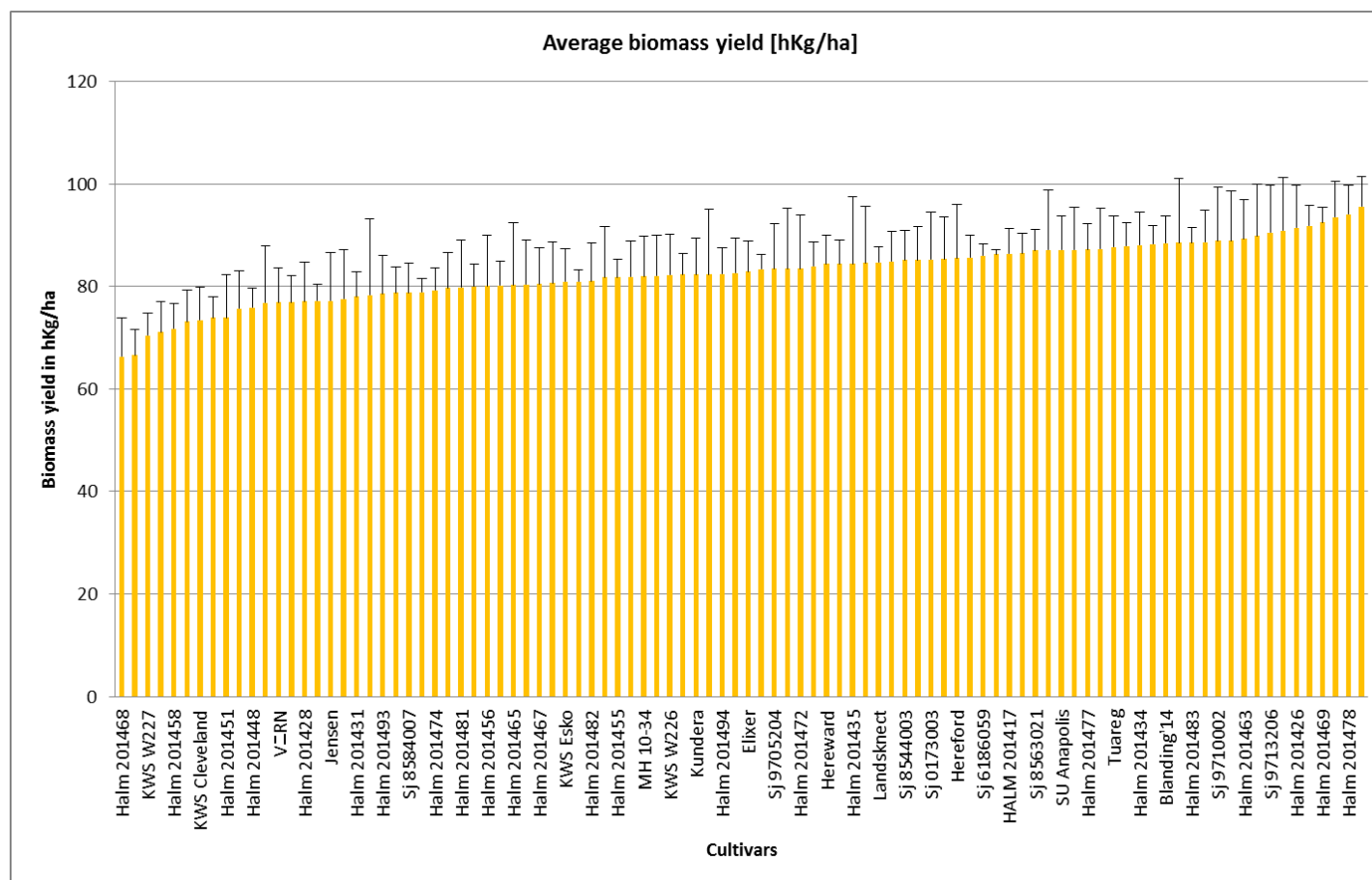


ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	13047,12	95	137,3381	8,704687	1,48E-46	1,30369
Within Groups	4543,916	288	15,77749			
Total	17591,03	383				



Results – Yellow biomass yield variation



ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	12865,13	95	135,4225	2,484899	3,04E-09	1,30387
Within Groups	15640,97	287	54,49816			
Total	28506,11	382				

Conclusion

Experiment S1 (36 cultivars)	P-Value
Grain yield	0,00019
Straw yield	0,0014
Harvest index	8,5658 E-08
Straw height	0,000037
Lodging	3,8560 E-27
Septoria	8,1056 E-13
Experiment AB (96 cultivars)	P-Value
Grain yield	1,4824 E-46
Straw yield	3,0402 E-09
Harvest index	8,6185 E-15
Straw height	9,1082 E-102
Lodging	9,1636 E-90
Septoria	3,9506 E-46

- All measured traits show a significant variation between cultivars
- The resulting traits need to be tested

Perspective

Next year – Straw samples of all replicates
Only measure traits of interest

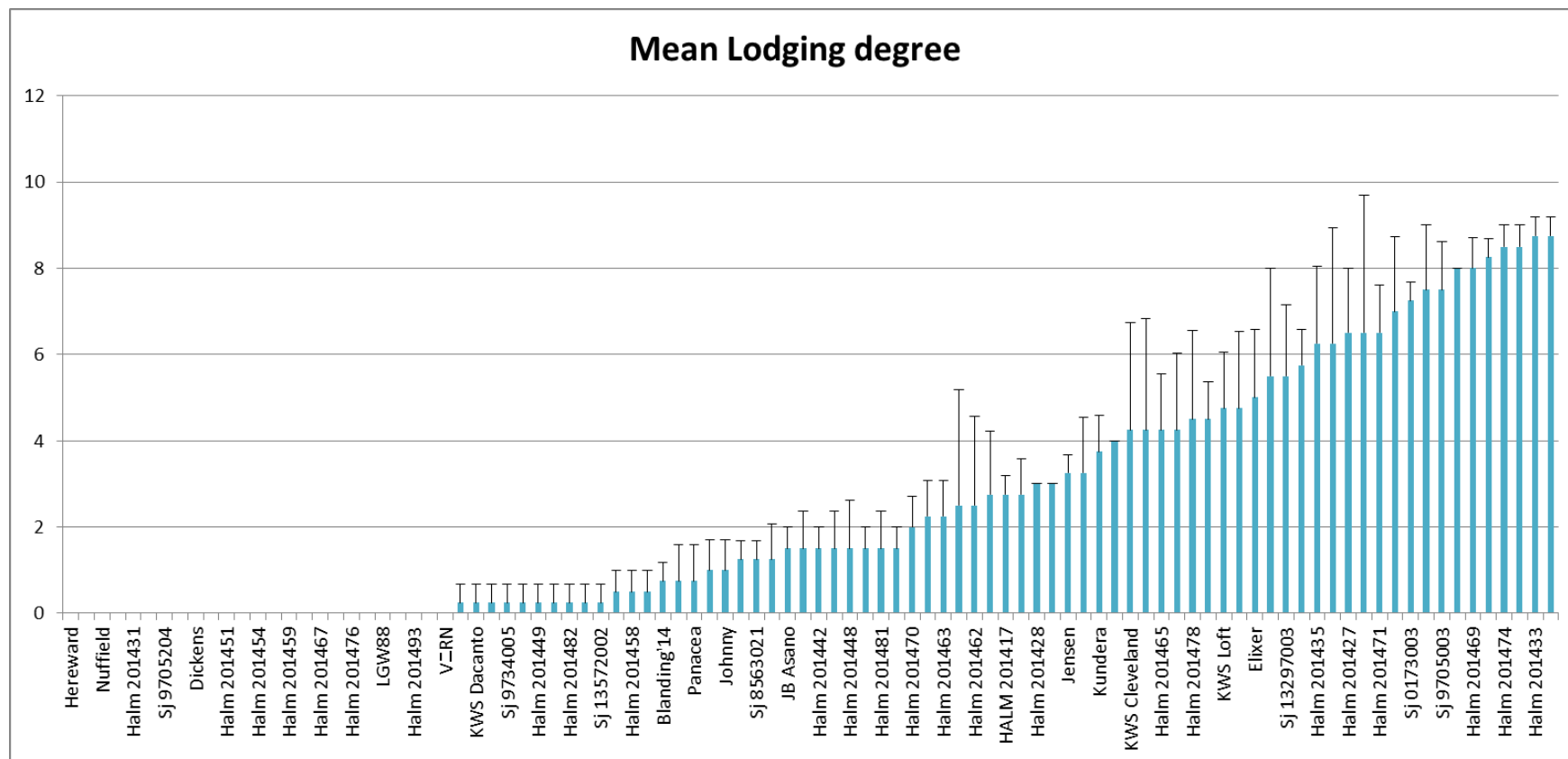
Thank you for your attention!

http://www.agriculture.com/crops/wheat/winter-wheat-growers-learn-of-two-new_144-ar44522?print

Questions?

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Results – Lodging variation



ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2916,185	95	30,69668	21,68153	9,16E-90	1,30369
Within Groups	407,75	288	1,415799			
Total	3323,935	383				

