



Tool Name

Extension Team: Plant Science
Author: Dayton Spackman
Contact Email: djs5487@gmail.com
Website:

Tool Version:
Last Updated:

Description:

This report provides independent and unbiased information for the evaluation of commercial corn grain and silage hybrids available in Pennsylvania. The corn hybrid evaluation program provides farmers, seed corn companies and university personnel with information on the relative performance of corn hybrids grown under Pennsylvania conditions. It should be used to supplement other sources of information, such as seed industry performance tests, other independent testing data, and on-farm performance records, when making hybrid selection decisions.

User Instructions:

The "Background" tab provides information specific to each trial location. This information is useful to evaluate selected hybrids on your farm under your growing conditions and practices. The "Table" tab contains all the data needed to make a final determination of the proper hybrids for your operation. The first factor to consider when using this report is hybrid maturity. Moisture or dry matter is a good indicator of hybrid maturity. Hybrids with lower moisture or high dry matter are generally adapted to shorter season environments. Identify hybrids in the list that you know are adapted to your area. Then, select hybrids based on the qualities you are looking for on your operation. For grain, high yielding hybrids should be selected based on moisture and maturity. Silage has many quality factors that will vary from farm to farm. Dry matter is a good place to start when selecting a silage hybrid, but working with a nutritionist will help determine what forage qualities will be best for your operation. We do not recommend using data from a single site, even if it is close to your farm, to make hybrid selection choices. It is best to use data averaged over multiple locations. The last tab "Trait Key" contains all the commercial designation of individual traits. The "Table" tab will provide the company specific nomenclature, but the "Trait Key" will give a more in depth explanation of these traits.

References:

This report is prepared by: Alex Hristov (PSU Animal Sciences), Chris Canale (Cargill), Dayton Spackman (PSU Plant Science), and James Breining (PSU Plant Science).

Acknowledgement of Risk:

This tool is provided for general informational purposes only and The Pennsylvania State University shall have no liability whatsoever for the use of or reliance on this tool.

2020 *Penn State/PDMP Corn Silage Hybrid Performance Trial Results*

Prepared by Alex Hristov (PSU Animal Sciences), Chris Canale (Cargill), Dayton Spackman(PSU Plant Science), and James Breining (PSU Plant Science).

Produced in cooperation with the Professional Dairy Managers of Pennsylvania (PDMP).

Visit Penn State's College of Agricultural Sciences on the Web: www.cas.psu.edu

Penn State College of Agricultural Sciences research, extension, and resident education programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

This publication is available in alternative media on request.

The Pennsylvania State University is committed to the policy that all persons shall have equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by state or federal authorities. It is the policy of the University to maintain an academic and work environment free of discrimination, including harassment. The Pennsylvania State University prohibits discrimination and harassment against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, sexual orientation, or veteran status. Discrimination or harassment against faculty, staff, or students will not be tolerated at The Pennsylvania State University. Direct all inquiries regarding the nondiscrimination policy to the Affirmative Action Director, The Pennsylvania State University, 328 Boucke Building, University Park, PA 16802-5901, Tel 814-865-4700/V, 814-863-1150/TTY.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Cooperative Extension is implied

© The Pennsylvania State University 2015

Production Details: Penn State/PDMP Corn Silage Hybrid Evaluation Trials

Site:	Bainbridge, PA
Cooperator	Meadow-Vista Dairy
Planting Date	May 12, 2020
Soil Type	Lansdale Loam
Herbicides	pre- Credit Extra 2.25qts, Mesotrione 6oz, Brawl ATZ 1.8qt
	post- none
Previous Crop	Corn silage/rye forage
Tillage	none
Starter Fertilizer	15 gal/A UAN
Insecticide	Defcon 4.67G
Manure	9000 gallon dairy
Fertilizer	sidedress 110 lbs N liquid nitrogen-injected
Harvest Date	August 27, 2020
Field Summary:	This field was planted on May 12. There was some grass pressure at the rear of plot and a post herbicide application was applied. Overall, this site had extremely fast emergence and corn looked good. Very tall plants and nice ears. Rainfall was less than normal during grain fill and the ears were smaller than normal. Performance was still very good.

Weather Summary:

Month	Precip.	GDD
May 12th-June 1st	1.5	282
June 1st-July 1st	6.4	638
July 1st- August 1st	2.1	844
August 1st - August 27th	5.39	642
Seasonal Total	15.39	2406

Precip. Data:

<https://climate.com>

GDD data:

<http://climatesmartfarming.org/tools/csf-growing-degree-day-calculator/>

Penn State/PDMP Corn Silage Hybrid Testing Program 2020
Medium-Late maturity (103-111) day RM silage hybrids in Bainbridge, PA

Notes: SEE BACKGROUND TAB

Cooperator: Meadow Vista Dairy

Brand	Hybrid	Traits ¹	Relative Maturity	Pop. Plants/ac	Dry Matter % ²	NIRS ³							Wet Chemistry		Yield tons/ac ⁸	OM Yield tons/ac ⁹	OMD % ¹⁰	DOM Yield tons/ac ¹¹	
						Crude Protein %DM	aNDFom %DM ⁴	Lignin %DM	uNDF 240 %DM	Ash %DM	Starch %DM	TFA %DM ⁵	NDFD 30 %NDF ⁶	IVSD %Starch ⁷					
Brevant Seeds	B10M97Q	36	110	34,000	30.8	8.4	38.2	3.1	13.9	3.6	28.6	1.9	55.0	72.9	21.4	6.3	55.2	3.5	
Pioneer	P1089AMXT	27	110	32,750	31.6	8.6	36.9	2.9	13.2	3.4	31.0	1.9	56.0	71.6	21.1	6.4	55.9	3.6	
LG Seeds	LG60C47STXRIB	34	110	34,000	32.6	8.7	36.8	2.9	12.7	3.4	33.2	2.4	55.6	75.7	20.7	6.5	58.1	3.8	
Masters Choice	MCT6070	conv.	110	29,333	32.6	8.6	34.7	2.7	11.5	3.4	36.6	2.3	58.4	74.1	19.0	6.0	59.4	3.6	
Brevant Seeds	B10R89Q	36	110	34,000	32.8	8.3	37.3	2.9	12.3	3.8	31.4	1.9	57.9	70.1	22.1	7.0	56.4	4.0	
Blue River Organic	64K93	conv.	111	32,250	32.9	8.4	38.6	2.9	14.0	3.1	28.8	1.7	51.9	71.3	20.3	6.5	53.5	3.5	
Kings Agriseeds	RT 58T81	1	108	33,333	33.3	8.7	35.7	2.8	13.0	3.2	30.6	2.0	55.4	69.0	19.7	6.4	54.1	3.4	
Blue River Organic	62G22	conv.	110	33,167	33.7	9.0	35.6	2.9	13.7	3.4	31.4	2.3	54.8	66.0	18.2	5.9	53.6	3.2	
Masters Choice	MCT5851	8	108	33,500	34.0	8.7	36.8	2.9	13.3	3.4	33.4	2.2	56.8	69.1	18.9	6.2	56.4	3.5	
LG Seeds	LG59C66VT2RIB	31	109	34,000	35.2	8.8	37.4	3.2	14.3	3.6	33.0	2.3	52.5	65.8	22.5	7.6	53.5	4.1	
Local Seeds	LCX07-22 3220	8	107	32,667	35.4	8.2	36.9	3.2	13.7	3.7	35.3	2.4	54.1	67.1	21.6	7.4	54.9	4.1	
Pioneer	P0947Q P0807Q	36	108	33,333	35.4	8.8	34.1	2.8	11.9	3.4	36.1	2.1	55.8	63.7	21.9	7.5	54.1	4.1	
Local Seeds	LCX06-20 TC	33	106	33,500	36.4	8.4	35.3	3.0	12.4	3.3	37.3	2.5	54.5	69.1	20.7	7.3	56.3	4.1	
Local Seeds	LC0398 5222EZ	11	103	34,000	40.9	8.7	34.0	3.0	13.2	3.4	39.1	2.9	51.6	62.1	21.3	8.5	53.1	4.5	
					Overall Mean	34.1	8.6	36.3	2.9	13.1	3.4	33.3	2.2	55.0	69.1	20.7	6.8	55.3	3.8
					LSD(0.1)	1.8	0.4	NS	NS	NS	NS	4.6	0.3	NS	5.1	2.1	1.0	3.0	0.6
					CV%	3.7	3.2	6.0	7.2	9.5	7.1	9.9	10.5	5.3	5.3	7.2	10.0	3.8	11.0

¹ Traits: See tab " Trait Key" for individual trait designation.

² Dry Matter: Tables are sorted by dry matter. Avoid making comparisons with hybrids that differ significantly in dry matter.

³ NIRS: Near Infrared Spectroscopy

⁴ aNDFom: aNDF on an ash-free basis.

⁵ TFA: Total Fatty Acids.

⁶ IVSD: Starch digestibility (% of starch) is analyzed by an in vitro wet chemistry method on samples ground through a 1-mm screen and incubated for 4 hours (IVSD).

⁷ NDFD30: is analyzed by an in vitro wet chemistry method on samples ground through a 1-mm screen and incubated for 30 hours

⁸ Yield: Silage yields are expressed on a 35 percent DM basis; all other parameters are expressed on a dry matter basis.

⁹ OM Yield: silage yield (tons/ac) expressed on an organic matter (OM) basis.

¹⁰ OMD: Organic Matter Digestibility - Please see "OMD Story" tab for information on how to use this column

¹¹ DOM Yield: Yield of digestible organic matter.

NS = Not Significant

Prepared by Alex Hristov (PSU Animal Sciences), Chris Canale (Cargill), Dayton Spackman (PSU Plant Science), and James Breining (PSU Plant Science).

Table Key #	Trait Family Product	Bt protein(s)	Marketed for control of:	Resistance to a Bt protein in the trait package has developed in :	Herbicide tolerant?
Conv.	Conventional	None	None	---	No
RR2	Roundup Ready 2	None	None	---	GT
Agrisure					
1	Agrisure GT	None	None	---	GT
2	Agrisure 3010 & 3010A	Cry1Ab	ECB SWCB	---	GT LL
3	Agrisure 3000 GT, 3011A	Cry1Ab, mCry3A	ECB SWCB RW	RW	GT LL
4	Agrisure Viptera 3110	Cry1Ab, Vip3A	BCW CEW ECB FAW SB SWCB TAW WBC	---	GT LL
5	Agrisure Viptera 3111	Cry1Ab, mCry3A, Vip3A	BCW CEW ECB FAW SB SWCB TAW WBC RW	RW	GT LL
6	Agrisure 3120 E-Z Refuge	Cry1Ab, Cry1F	BCW ECB FAW SB SWCB	FAW WBC	REFER TO BAG FOR SPECIFIC LETTER CODE: EZ0=GT ONLY EZ1= GT LL
7	Agrisure 3122 E-Z Refuge	Cry1Ab,Cry1F, mCry3A, Cry34/35Ab1	BCW ECB FAW SB SWCB RW	FAW WBC RW	
8	Agrisure Viptera 3220 E-Z Refuge	Cry1Ab, Cry1F, Vip3A	BCW CEW ECB FAW SB SWCB TAW WBC	---	
9	Agrisure Viptera 3330 E-Z Refuge	CryAb, Vip3A, Cry1A.105+CryAb2	BCW CEW ECB FAW SB SWCB TAW WBC	---	
10	Agrisure Duracade 5122 E-Z Refuge	Cry1Ab, Cry1F, mCry3A, eCry3.1Ab	BCW ECB FAW SB SWCB RW	FAW WBC RW	
11	Agrisure Duracade 5222 E-Z Refuge	Cry1Ab, Cry1F, Vip3A, mCry3A, eCry3.1Ab	BCW CEW ECB FAW SB SWCB TAW WBC RW	RW	
Herculex					
12	Herculex 1 (HX1)	Cry1F	BCW ECB FAW SB SWCB	ECB FAW SWCB WBC	LL RR2 (most)
13	Herculex RW (HXRW)	Cry34/35Ab1	RW	RW	
14	Herculex XTRA (HXX)	Cry1F, Cry34/35Ab1	BCW ECB FAW SB SWCB RW	FAW SWCB WBC RW	
Optimum					
15	TRIssect (CHR)	Cry1F, mCry3A	BCW ECB FAW SB SWCB RW	ECB FAW SWCB WBC RW	LL RR2
16	Intrasect (YHR)	Cry1F, Cry1Ab	BCW ECB FAW SB SWCB	FAW WBC	LL RR2
17	Intrasect TRIssect (CYHR)	Cry1Ab, Cry1F, mCry3A	BCW ECB FAW SB SWCB RW	FAW WBC RW	LL RR2
18	Leptra (VYHR)	Cry1F, Cry1Ab, Vip3A	BCW CEW ECB FAW SB SWCB TAW WBC	---	LL RR2
19	Intrasect Xtra (YXR)	Cry1F, Cry1Ab, Cry34/35Ab1	BCW ECB FAW SB SWCB RW	FAW WBC RW	LL RR2
20	Intrasect Xtreme (CYXR)	Cry1F, Cry1Ab, mCry3A, Cry34/35Ab1	BCW ECB FAW SB SWCB RW	FAW WBC RW	LL RR2
21	AcreMax (AM)	Cry1F, Cry1Ab	BCW ECB FAW SB SWCB	FAW WBC	LL RR2
22	AcreMax CRW (AMRW)	Cry34/35Ab1	RW	RW	LL RR2
23	AcreMax1 (AM1)	Cry1F, Cry34/35Ab1	BCW ECB FAW SB SWCB RW	FAW SWCB WBC RW	LL RR2
24	AcreMax Leptra (AML)	Cry1Ab, Cry1F, Vip3A	BCW ECB FAW SB SWCB TAW WBC CEW	---	LL RR2
25	AcreMax TRIssect (AMT)	Cry1F, Cry1Ab, mCry3A	BCW ECB FAW SB SWCB RW	FAW WBC RW	LL RR2
26	AcreMax Xtra (AMX)	Cry1F, Cry1Ab, Cry34/35Ab1	BCW ECB FAW SB SWCB RW	FAW WBC RW	LL RR2
27	AcreMax Xtreme (AMXT)	Cry1F, Cry1Ab, mCry3A, Cry34/35Ab1	BCW ECB FAW SB SWCB RW	FAW WBC RW	LL RR2
Yieldgard/Genuity					
28	YieldGard CB (YGCB)	Cry1Ab	ECB SWCB	---	RR2
29	YieldGard VT Rootworm (YGRW)	Cry3Bb1	RW	RW	RR2
30	YieldGard VT Triple	Cry1Ab, Cry3Bb1	ECB SWCB RW	RW	RR2
31	VT Double PRO VT Double PRO RIB complete	Cry1A.105, Cry2Ab2	CEW ECB FAW SB SWCB	CEW	RR2
32	VT Triple PRO VT Triple PRO RIB complete	Cry1A.105, Cry2Ab2, Cry3Bb1	CEW ECB FAW SB SWCB RW	CEW RW	RR2
33	Trecepta (or RIB complete)	Cry1A.105, Cry2Ab2, Vip3A	BCW CEW ECB FAW SB SWCB TAW WBC	---	RR2
Others					
34	Smartstax Smartstax Refuge Advanced Smartstax RIB Complete	Cry1A.105, Cry2Ab2, Cry1F, Cry3Bb1, Cry34/35Ab1	BCW CEW ECB FAW SB SWCB RW	CEW WBC RW	LL RR2
35	Powercore (or Refuge Advanced)	Cry1A.105, Cry2Ab2, Cry1F	BCW ECB FAW SB SWCB CEW	CEW WBC	LL RR2
36	QROME (Q)	Cry1Ab, Cry1F, mCry3A, Cry34/35Ab1	BCW ECB FAW SB SWCB	FAW WBC RW	LL RR2
	BCW = black cutworm	SB = stalk borer	GT = glyphosate tolerant		
	CEW = corn earworm	SWCB = southern corn borer	LL = Liberty Link, glufosinate tolerant		
	ECB = European corn borer	TAW = true armyworm	RR2 = Roundup Ready 2, glyphosate tolerant		
	FAW = fall armyworm	WBC = western bean cutworm			
	RW = corn rootworm				

Source: <https://www.texasinsects.org/bt-corn-trait-table.html>

The OMD Index

The digestibility of nutrients in corn silage is paramount when determining nutritional value. Starch and NDF are responsible for much of the digestible energy in corn silage. In order to give dairy producers and nutritionist a tool to evaluate corn silage hybrids, we developed a new digestibility index, called the Organic Matter Digestibility Index (OMDI or just OMD), and is based on digestibility of protein, fat, NDF, and starch, the sum of which makes up approximately 86-88% of the organic matter in corn silage.

The OMD index represents the digestible portion of silage organic matter and is based on chemical analyses only. It does not predict dry matter intake or milk production, although numerous studies clearly show that digestibility of forage organic matter is directly related to lactation performance of dairy cows. The OMD index does not represent the absolute digestibility of silage organic matter, as this can be reliably determined only in experiments with live animals. But, OMD is representative of the potentially digestible organic matter of the whole plant and can be used to compare silage hybrids. Furthermore, simulation analyses using the Cornell Net Carbohydrate and Protein System (CNCPS v.7.0; Cornell University, Ithaca, NY) show that OMD correlates reasonably well with model-predicted milk production of dairy cows fed a standard diet containing approx. 40% corn silage (dry matter basis).

How is the OMD Index Used?

Feeding value of corn silage is mostly associated with digestibility of NDF or starch. A long-standing goal of PDMP is to create a single measure of silage nutritive value using several variables associated with digestibility. Traditional variables, crude protein (accounted for fiber-bound nitrogen), NDF, starch, lignin, and fat, are combined with in vitro digestibility determinations for NDF (NDFD30) and starch (IVSD; 4-hour, 1-mm grind). Once combined, these digestibility coefficients sum to predict OMD.

The OMD Index is calculated using the following equation: $OMDI (\%) = \frac{\{[(\text{crude protein} - \text{NDFCP}) \times 0.89] + (\text{total fatty acids} \times 0.75) + (\text{starch} \times \text{IVSD} \div 100) + [(\text{aNDFom} - \text{lignin}) \times \text{NDFD30} \div 100]\}}{[(\text{crude protein} - \text{NDFCP}) + \text{total fatty acids} + \text{starch} + (\text{aNDFom} - \text{lignin})] \times 100}$.

Where: OMDI (%) is **Organic Matter Digestibility Index**; crude protein, total fatty acids, starch, NDFCP (NDF-bound crude protein), aNDFom (ash-free basis, amylase-treated NDF), and lignin (ash-free) are expressed as % of corn silage dry matter; 0.89 is assumed (based on literature data) coefficient of digestibility of silage crude protein; 0.75 is assumed (based on literature data) coefficient of digestibility of silage total fatty acids; IVSD is starch digestibility (by wet chemistry at 4-hour and sample ground through a 1-mm sieve) expressed as % of starch; and NDFD30 is NDF digestibility at 30 h in vitro (by wet chemistry and sample ground through a 1-mm sieve) expressed as % of NDF.

Use of OMDI: The OMD index is intended to represent the digestible portion of silage dry matter and is based on chemical analyses. OMD does not represent the absolute digestibility of silage organic matter, but it is representative of the potentially digestible organic matter and can be used when comparing silage hybrids. ***Simply put, the higher the OMD value, the higher the overall expected digestibility of the silage.*** OMD reflects the digestibility of key nutrients within the entire plant. Producers without carryover of silage should consider the interaction of OMD and DOM (digestible organic matter yield per acre) as yield of digestible organic matter will be equally as relevant as OMD.

Conclusion

Organic matter digestibility is not a new measure. For years, researchers and nutritionists have used digestibility estimates to formulate rations for dairy cattle. Today, integrating these data is a useful practice to gauge silage value and match hybrid to farm needs. Put simply, OMD measures whole plant digestibility. Emphasis is on digestibility of all main nutrients. In the end, we hope OMD serves to facilitate discussion among producer, seed consultant, and dairy nutritionist as to which hybrids offer the best nutrient value for dairy cows.