

Potato Breeding, Selection, and Cultivar Development – North Dakota 2012 Summary

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Potato Improvement at NDSU...



- Goal of releasing exceptional, multi-purpose cultivars that meet the needs of potato producers and the industry in ND, MN, the Northern Plains, and beyond

Objectives

- Develop potato (*Solanum tuberosum* Group Tuberosum L.) cultivars for North Dakota, the Northern Plains, and beyond, using traditional hybridization and biotechnological techniques as appropriate, that are genetically superior for yield, market-limiting traits, and processing quality.
- Identify and introgress into adapted potato germplasm, genetic resistance to major disease, insect, and nematode pests causing economic losses in potato production in North Dakota and the Northern Plains.
- Identify and develop enhanced germplasm with resistance to environmental stresses and improved quality characteristics for adoption by consumers and industry.

End of an Era...

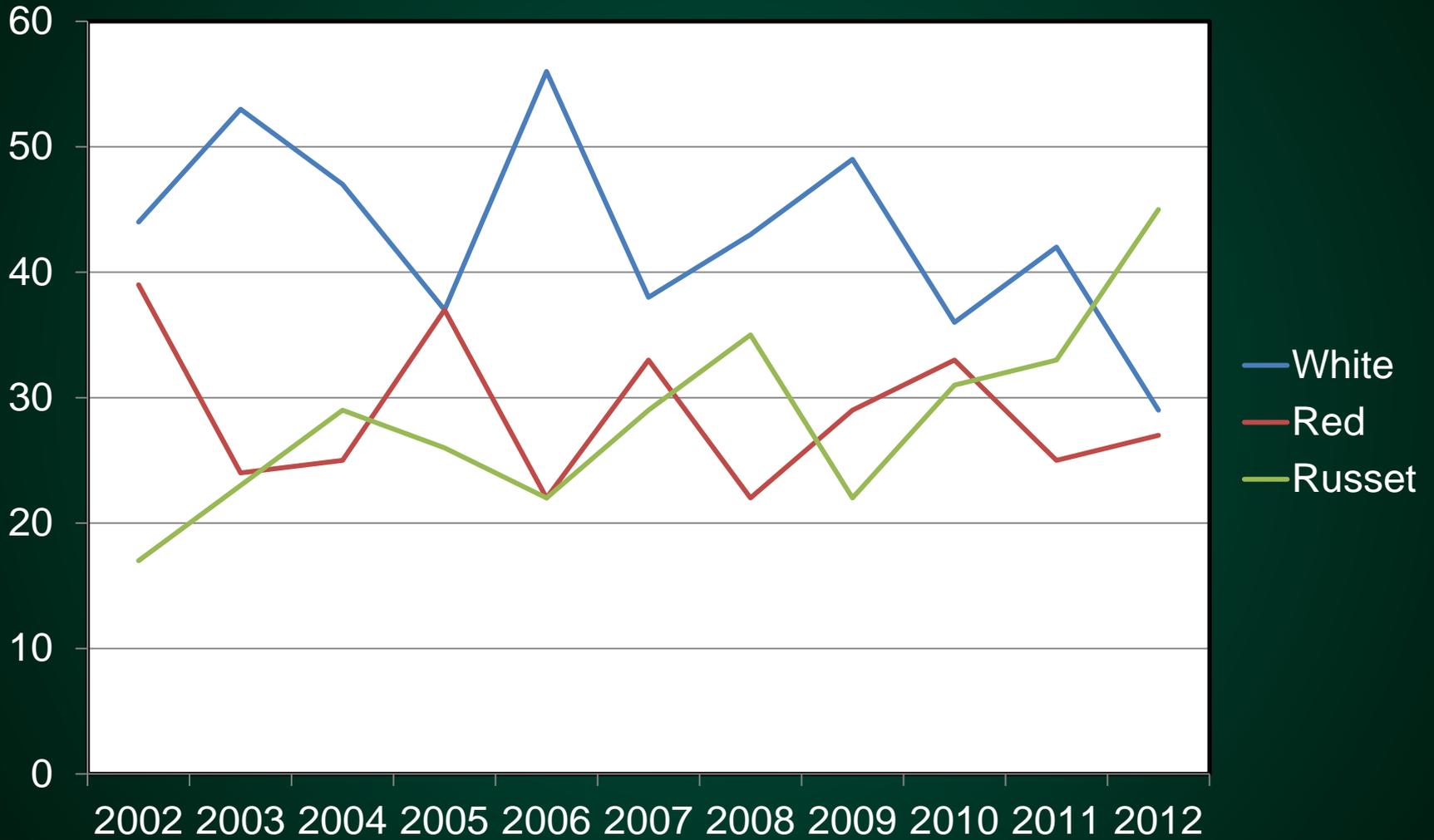


Crossing



- 248 families were created
- 139 parental genotypes were used
- New families...
 - 55% included late blight resistance breeding
 - 38% Colorado potato beetle (CPB) resistance breeding
 - 28% chip processing
 - 47% frozen processing with cold sweetening resistance breeding

Crossing



Seedling and Minituber Production



- Very rapid
- Higher tuber numbers and better size
- Minituber lots
- Seedling crops
 - Summer, fall & winter

Seed Production - 2012

- Absaraka
 - Seed Maintenance and Increase (3 lots)
- Baker, MN
 - Seed Maintenance and Increase
- Langdon
 - Seedling Nursery and Increase Lots



Langdon...



- Long history
- Adaptation
- 94,580 seedlings were planted
- Representing 458 families
 - Cold sweetening, late blight, and Colorado Potato Beetle resistance, among many other traits
- 581 seedlings retained for 2013 evaluation
- Increase lots (27)
 - Minitubers
 - G1s

Research Trial Locations - 2012

- Crystal
 - Fresh Market, NCRPVT Fresh, Preliminary Fresh
- Grand Forks
 - CPB Trials
- Hoople
 - Chip Processing, NCRPVT Chip, NCPT, PreChip
- Inkster
 - NCRPVT Trials, Chip,
- Larimore
 - Processing, NCRPVT Processing, PreProcessing, NFPT, Simplot Trials, Out-of-State Seedlings
- Oakes
 - Processing
- Park Rapids
 - Processing and Acrylamide
- Williston
 - Processing



Evaluations



- Agronomic Characteristics
- Yield and Grade Components
- Quality Parameters
 - Specific gravity
 - Chipping
 - French frying
 - Bruise evaluations
 - Sucrose rating



Screening and Development Trials



- Disease Screening
 - Bacterial Ring Rot
 - Pink Rot and *Pythium* Leak
 - Late Blight
 - *Fusarium* Dry Rot
 - *Verticillium* Wilt
 - Tuber Blemish Diseases
- Insect Resistance Screening
 - Colorado Potato Beetle
- Stress Resistance
 - Cold Sweetening
 - Sugar End
- Cultural Management
 - Metribuzin Tolerance
 - 2,4-D Response
 - Nitrogen, Potassium Requirements
 - Seed Piece Spacing

Potato Innovation Project



- Submitted proposal to ND Specialty Crops Block Grant program
- Grew 770 selections at Larimore
- Diverse germplasm
- Contracts have not been issued
- Samples remain in storage

Advancing Selections...



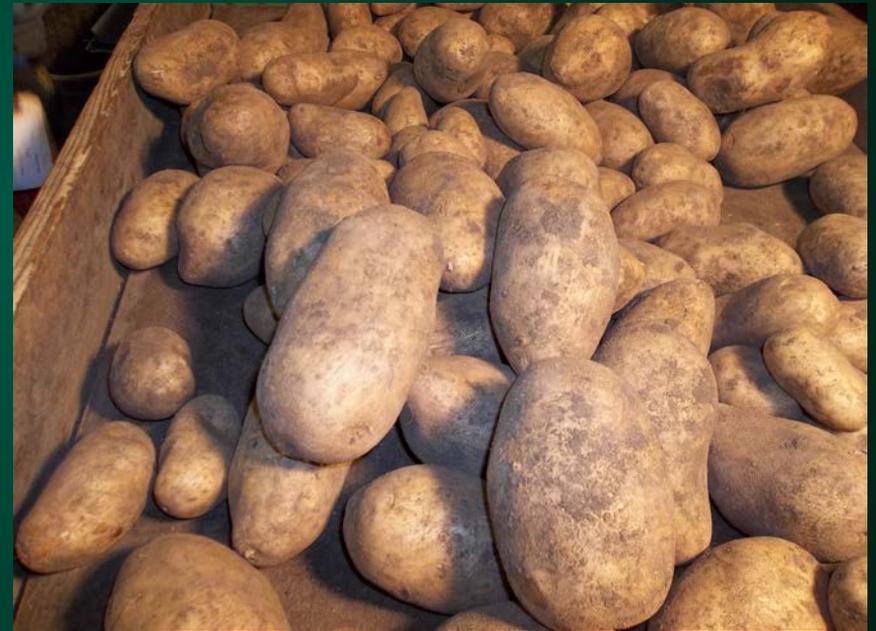
ND8068-5Russ

- ND2667-9Russ x ND4233-1Russ
- Medium vine size
- Very early vine maturity
- Medium to high yield potential
- Dual-purpose
- High specific gravity
- Good storability with low sugar accumulation and excellent frozen processing quality after 7 months storage
- Russet Norkotah fertility regime



ND070927-2Russ

- AH66-4x ND860-2
- Medium vine size
- Medium-late vine maturity
- Medium to high yield potential
- Dual-purpose
- High specific gravity
- Good storability with low sugar accumulation and good French fry processing quality
- Early in evaluation process for cultivar specific management information, including fertility rates, with-in row spacing and disease resistance evaluations



ND071079-2Russ

- ND6242-10Russ x Dakota Russet
- Medium-large vine size
- Medium-late vine maturity
- High yield potential
- Dual-purpose
- High specific gravity
- Good storability with low sugar accumulation and excellent processing quality
- Early in evaluation process for cultivar specific management information, including fertility rates, with-in row spacing and disease resistance evaluations



WND8625-2Russ

- W2699-1Russ x Silverton Russet
- Medium-large vine size
- Medium vine maturity
- Medium to high yield potential
- Dual-purpose
- High specific gravity (+1.087 across ND and MN irrigated locations)
- Good storability with low sugar accumulation and good frozen processing quality after 7 months storage
- Early in evaluation process for cultivar specific management information, including fertility rates, with-in row spacing and disease resistance evaluations



AND97279-5Russ

- A92001-2 x Ranger Russet
- Medium-large vine size
- Medium-late vine maturity
- Medium to high yield potential
- Dual-purpose
- High specific gravity (about 1.087 across ND and MN irrigated locations)
- Good storability with low sugar accumulation and good frozen processing quality
- Early in evaluation process for cultivar specific management information, including fertility rates, with-in row spacing and disease resistance evaluations.



Dakota Russet x Dakota Trailblazer Hybrids

- Hybrids include ND049546B-10Russ, ND049546B-15Russ, ND049546b-27Russ, ND050032-4Russ, and ND060735-3Russ
- Yield potential for all is medium to high
- Maturity is medium for all
- Specific gravity is midpoint between parents
- All are dual-purpose
- All have excellent French fry quality and low sugar accumulation in storage
- Early in evaluation process for cultivar specific management information



ND4659-5R



- NorDonna x ND2842-3R
- Suited for the fresh market
- Medium vine with red-purple flowers
- Medium maturity
- Medium yield potential
- Bright red, round, smooth tubers with white flesh and shallow eyes
- Medium specific gravity
- No outstanding disease or pest susceptibilities
- Stores well

ND8555-8R



- ND7188-4R x ND5256-7R
- Suited for the fresh market
- Medium maturity
- Medium-large vine size
- High yield potential
- Bright red, round, smooth tubers with white flesh and shallow eyes
- Very uniform tuber size profile
- Medium specific gravity
- Stores well

ND6002-1R

- NorDonna x Bison
- Medium sized vine
- Medium maturity
- Medium yield potential
- Round, smooth, bright red tubers with smooth eyes and bright white flesh
- Medium specific gravity
- Early in evaluation process



ND7132-1R



- ND5002-3R x ND5438-1R
- Medium maturity
- Medium yield potential
- Bright red skinned, oval to oblong tubers with white flesh
- Early in evaluation process

AND00272-1R

- MN17922 x A92653-6R
- Suited for the fresh market
- Medium vine with red-purple flowers
- Medium-late maturity
- Medium yield potential
- Bright red, round to oval, tubers with white flesh, shallow eyes and smooth tuber type.
- Low to medium specific gravity
- No outstanding disease or pest susceptibilities
- Stores well



ND7519-1

- ND3828-15 x W1353
- Medium sized vine
- Medium-late maturity
- High yield potential
- High specific gravity
(+1.090 average in ND)
- Chips from 42F storage



ND8304-2

- ND860-2 x ND7083-1
- Medium early maturity
- Small to medium sized vine
- Medium yield potential
 - Nice tuber type, smaller size profile
- High specific gravity
- Chips from 42F storage
 - Excellent cold chipping selection



ND7799c-1

- Dakota Pearl x Dakota Diamond
- Medium vine size
- Medium-late maturity
- High yield potential
 - Nice tuber type and tuber size profile
- Medium to high specific gravity (1.086 average)
- Chips from 42F storage



2012 Highlights

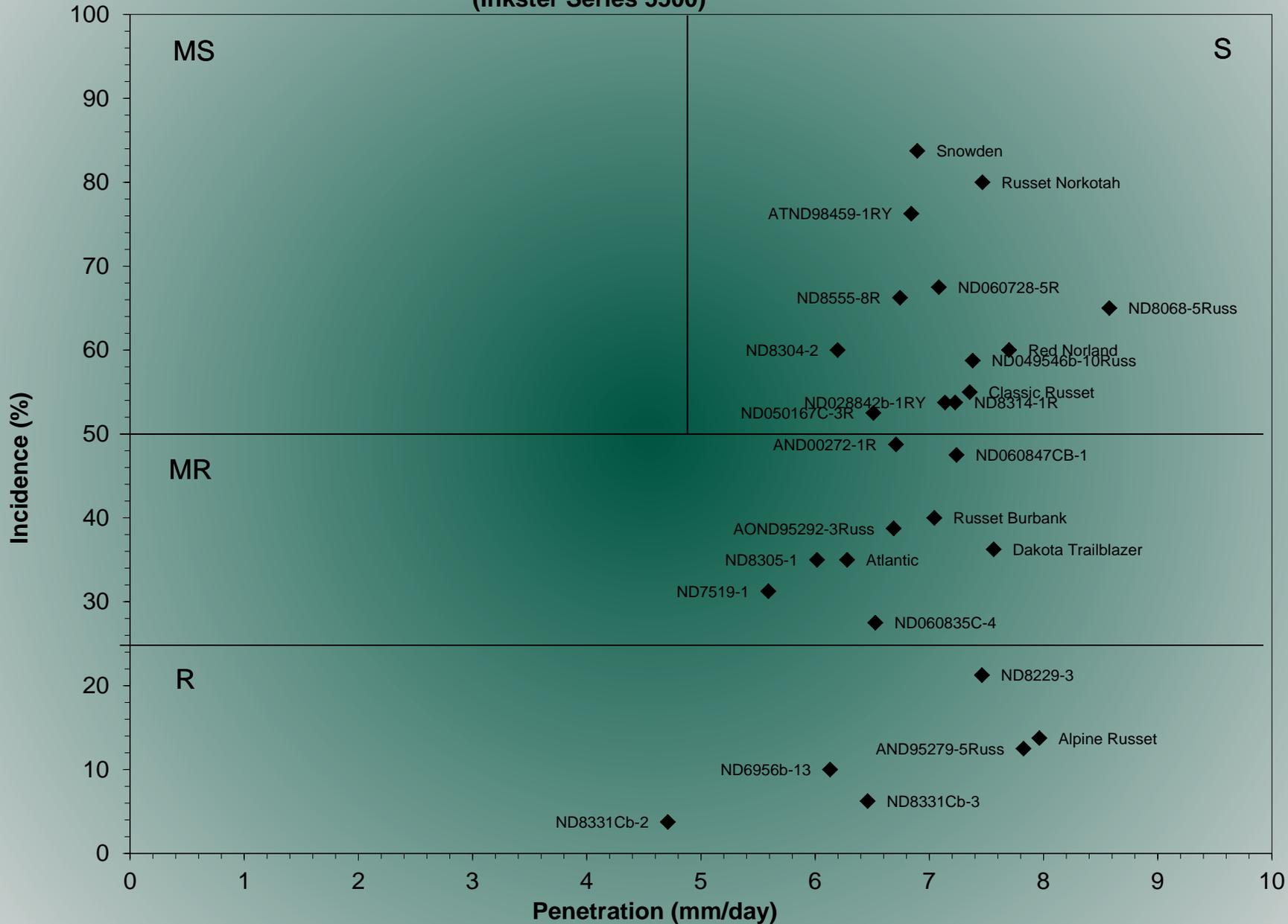


Dakota Russet

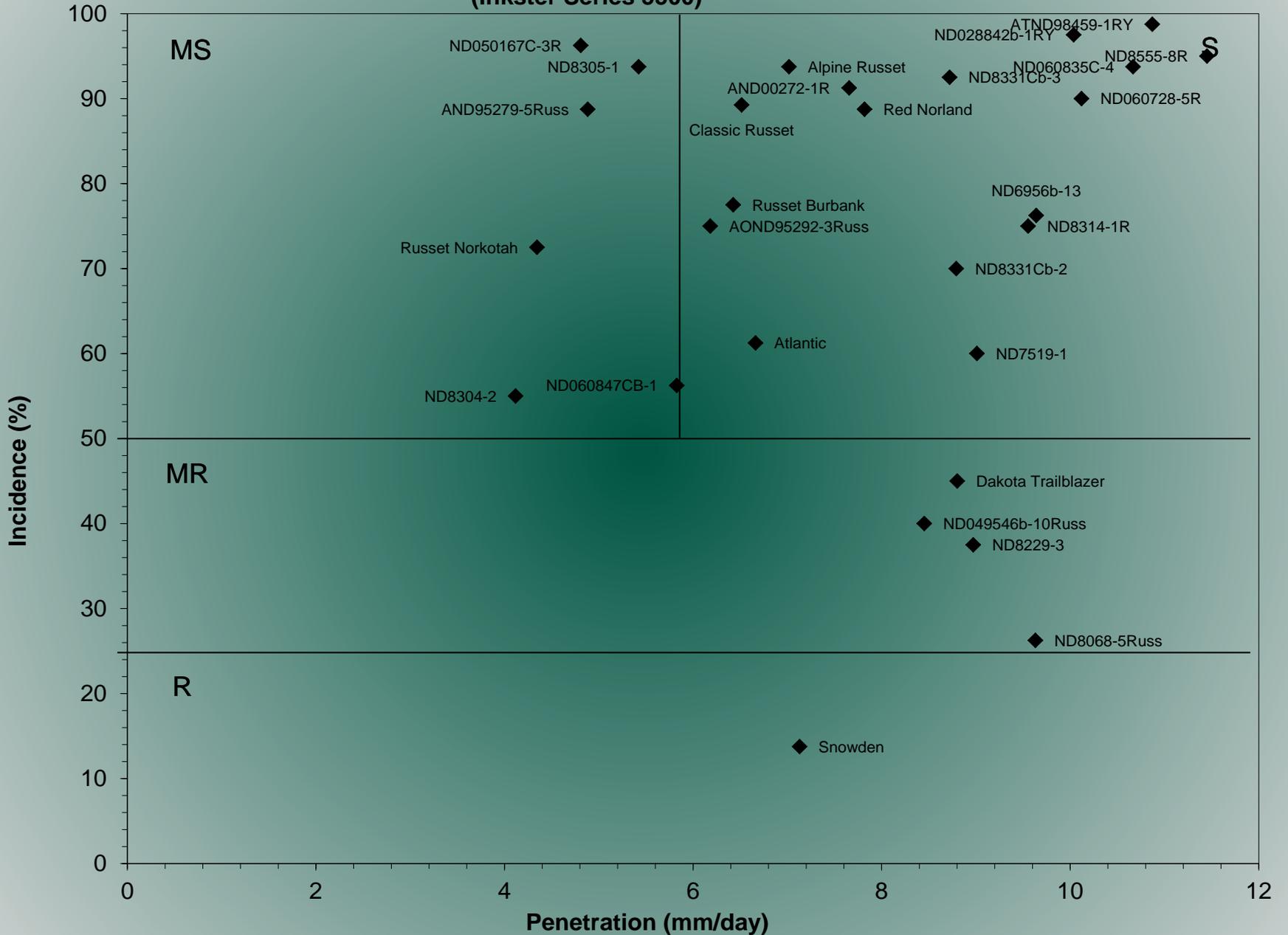
- Evaluated as ND8229-3
- Marcy x AH66-4
- Medium maturity
- Medium vine size
- High yield potential
- Good storability and excellent fry color from 45F storage
- High specific gravity
- Resistance to sugar ends, pink rot, *P. nicotianae*, Verticillium wilt, and moderate resistance to Pythium leak
- Tolerant of metribuzin applications



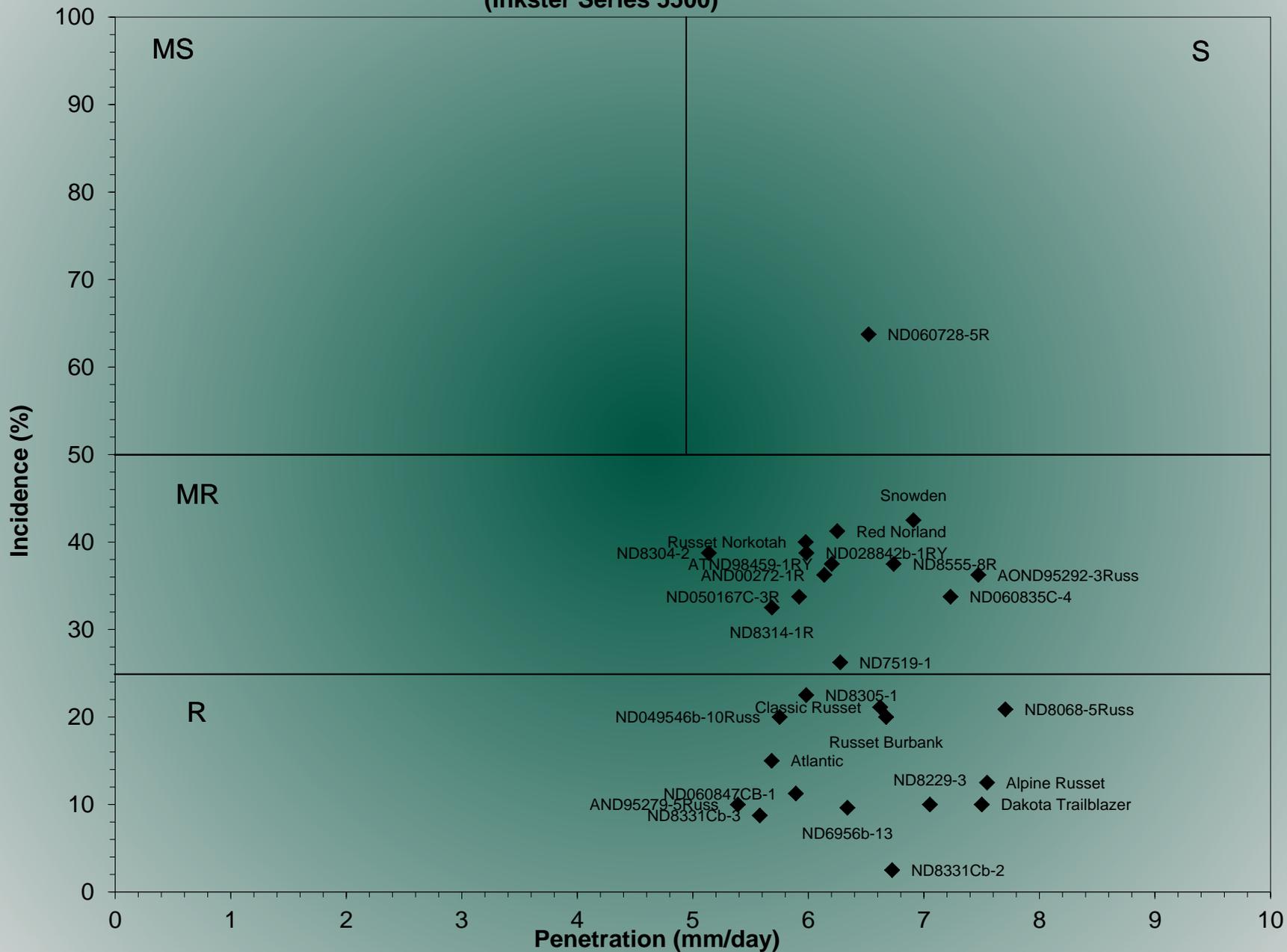
2011 NDSU Tuber Rot Genotype Evaluation - Pink Rot (Inkster Series 5500)



2011 NDSU Tuber Rot Genotype Evaluation - Leak (Inkster Series 5500)



2011 NDSU Tuber Rot Genotype Evaluation - *P. nicotianae*
(Inkster Series 5500)



Thanks to:

The North Dakota Agricultural Experiment Station

Departments of Plant Sciences, Plant Pathology and Entomology, NDSU

Northern Plains Potato Growers Association

MN Area II Potato Research and Promotion Council

US Potato Board

North Dakota State Seed Department

Minnesota Department of Agriculture

Potato Producers and Industry Representatives from North Dakota,

Minnesota and beyond

Cooperative Researchers and Their Staffs



NDSU NORTH DAKOTA
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Dakota Trailblazer

- A89163-3LS x A8914-4
- Medium-late maturity
- High yield potential
- Good storability and low sugar accumulation in storage.
- High specific gravity
- Resistance to *Vertillium* wilt, pink rot, sugar ends, and late blight (foliar) in field evaluations. Hollow heart and blackspot bruise occasionally noted. Low asparagine clone.
- Tolerant of metribuzin applications.

