

FY22 ANNUAL REPORT

NDSU RESEARCH FOUNDATION

July 1, 2021 - June 30, 2022

STAFF

Joycelyn Lucke, Interim Executive Director, J.D.

Saurabhi Satam, Business Development & Licensing Associate

McKenna Tysdal, Business Development & Licensing Administrator



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EXECUTIVE SUMMARY

The 2021-2022 fiscal year represented a period of great change for NDSU and the NDSU Research Foundation.

In December 2021, NDSU’s Vice President for Research and Creative Activity and NDSU Research Foundation Board member and Treasurer Colleen Fitzgerald announced that NDSU had been designated as an R1 research institution by the Carnegie Classification of Institutions of Higher Education. Carnegie’s R1 distinction of “Doctoral University: Very High Research Activity” is Carnegie’s highest classification and is presented to only the top research institutions in the country.

In May 2022, NDSU welcomed Dr. David Cook as the institution’s president. President Cook also serves as the NDSU Research Foundation’s Board president and he has indicated that, in alignment with NDSU’s strategic plan, he will prioritize growing and strengthening NDSU’s research capabilities and activities as one of his five key focus areas. This also includes maintaining the R1 Carnegie Classification status.

Additionally, in April 2022, former Executive Director Jolynne Tschetter left the NDSU Research Foundation. This prompted the Board to consider changes to its structure to advocate and promote a transparent and more focused approach to its operations. The Foundation team, along with new Business Development and Licensing Administrator McKenna Tysdal, are excited to embrace these changes and modernize operations while expanding the protection and commercialization services for NDSU technologies.

Joycelyn Lucke
Interim Executive Director

FY2022 HIGHLIGHTS — PLANT VARIETIES

‘DAKOTA RUSSET’



The ‘**Dakota Russet**’ potato became one of eight varieties that are accepted by McDonald’s in North America. The approval process was completed in March 2022. The variety was officially named and released in 2012 after being selected as a seedling by Dr. Asunta Thompson in 2001. ‘Dakota Russet’ has uniform, blocky tubers, creamy white flesh and golden russet skin that is well suited for fry applications. The variety produces low sugars, which results in consistent french fry color and less undesired defects like dark ends. Improved fry texture consistency can be attributed to the potatoes’ high specific gravity and consistent internal dry matter distribution (solids).

‘Dakota Russet’ was developed with the needs of Midwest farmers in mind, producing consistently high yields and fitting the shorter growing season with its medium maturity. The variety also thrives in a wide range of climatic conditions. It is extremely resilient, demonstrating resistance to several of the common diseases typically present in potatoes.

‘Dakota Russet’ has begun rolling out to McDonald’s suppliers, where they are peeled, cut and prepared for restaurants to turn into the same hot, crispy fries McDonald’s customers love.

NEW VARIETIES

New agricultural varieties released from NDSU in FY2022:

- ‘ND Polar’ navy bean
- ‘ND Heron’ hard red spring wheat

ISSUED PVPS

Plant Variety Protection certificates issued:

- ‘ND18008GT’ soybean
- ‘ND Whitetail’ white kidney bean
- ‘ND Falcon’ pinto bean
- ‘ND Pegasus’ great northern bean
- ‘ND Rolette’ conventional soybean
- ‘ND Frohberg’ hard red spring wheat
- ‘ND Noreen’ hard red winter wheat
- ‘ND Stanley’ durum wheat.

FY2022 HIGHLIGHTS — TECHNOLOGIES

HORIZONTAL FLUID FLOW BIOREACTOR FOR CELL GROWTH, TISSUE ENGINEERING AND CANCER TESTBEDS

Bioreactors play a vital role in cancer research; different bioreactors offer scientific insights into different aspects of cancer metastasis such as testing novel cancer drugs and drug delivery systems, with zero human risk. Due to the lack of human samples and pertinent animal models, there is a need for modern and innovative bioreactor systems for an adept understanding of cancer metastasis/ progression. The Katti Research group has designed a novel horizontal flow bioreactor that mimics both the primary as well as secondary sites of metastasized cancers and provides a simulated microenvironment to study intricate details of cancer metastasis. The bioreactor consists of several individual culture chambers connected to fresh source of growth medium. The advantage of individual chambers is to conduct different studies independently.

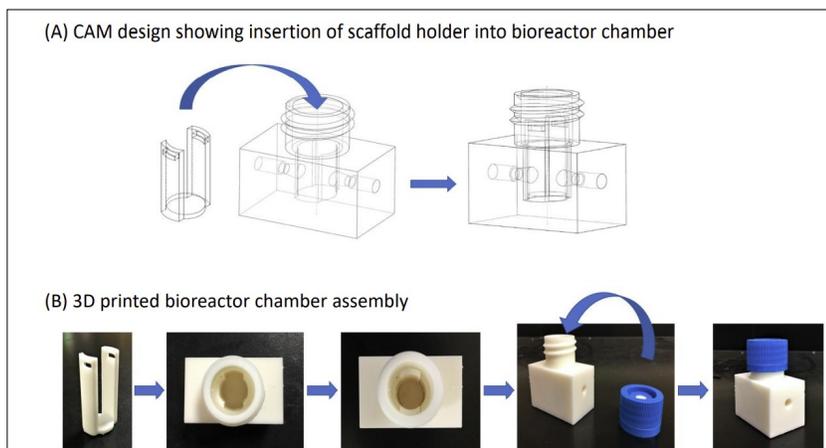


Fig. Horizontal assembly of a single chamber

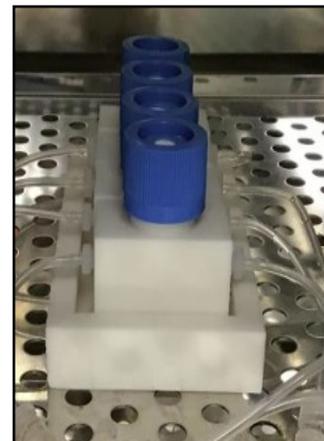


Fig. Multiple chamber assembly

For example, this bioreactor is an excellent model to study the migration and attachment of cancer cells to bone tissue, subsequent cancer cell growth, and overall host cell response, simultaneously.

Beyond cancer metastasis, the bioreactor can also be used to analyze new biomarkers, evaluate drug efficacy and determine drug combinations for personalized medicine.

The Katti Research group is continuing this line of research independently and with industry partners. A Provisional patent application was filed in April 2022 to protect this invention and the Research Foundation is working to identify potential licensees to commercialize this technology.

ISSUED PATENTS

Two patents were issued in the US while one was issued outside the US:

- US Issued Patents:
 - * Novel Monomers from Biomass
 - * Viral Vaccines and Methods of Forming the Same
- European Issued Patents:
 - * Bio-Based Acrylic Monomers and Polymers Thereof

FY2022 HIGHLIGHTS — HORTICULTURE

HYLAND GUARD™



The **Hyland Guard™ Mountain Pine** (*Pinus uncinata* 'GuarDak') is the newest addition to the NDSU Research Foundation's horticulture portfolio. Germplasm for this release began in 1972, exactly 50 years ago, with a single seedling selection originating from a population of *Pinus uncinata* collected from the Hrubý Jeseník mountain range of Eastern Sudetes in the northern region of Moravia, near the village of Rejvíz of the Czech Republic.

The evaluated tree (pictured) has grown for 49 years and is a cold hardy selection of *Pinus uncinata* that has survived without damage in USDA climatic zone 3b at -37°C.

Ornamental attributes include two-needled pine with forest green needle color and is not considered messy relating to cone shedding as a result of seed cones being fairly small, 30 by 40 millimeters. It is a unique cold hardy upright narrow pyramidal evergreen conifer that will reach a mature height (8 m) that is taller than the currently available upright Mugo pine (*Pinus mugo*) cultivars.

ISSUED TRADEMARKS

Horticulture trademark issued in the US:

- The KoolKat® Katsura Tree

NDSU Research Foundation Overview

380+

PLANT VARIETIES, HORTICULTURE CULTIVARS AND TECHNOLOGIES UNDER ACTIVE MANAGEMENT

92

ISSUED ACTIVE PATENTS
39 PENDING PATENT APPLICATIONS

25+

AVERAGE NUMBER OF DISCLOSURES ANNUALLY SINCE 2020

72

ACTIVE US PVP CERTIFICATES

24 FOREIGN PBR REGISTRATIONS
14 PENDING PVP/PBR APPLICATIONS

34

REGISTERED U.S. TRADEMARKS
20 FOREIGN REGISTERED TRADEMARKS

PLANT VARIETIES CONTRIBUTING TO INCOME



ND Hammond



Talon



ND-Genesis

BARLEY

Conlon
ND-Genesis
Pinnacle
Rawson

DURUM

Alkabo
Carpio
Divide
Joppa
ND Grano
ND Riveland

EDIBLE BEANS

Eclipse
Lariat
ND Falcon
ND Palomino
ND Pegasus
ND Twilight
ND Whitetail
ND307
Rosie
Stampede
Talon

FLAX

ND Hammond

OATS

Austin
Beach
Bond
Boss
Brigalow
Bronco
Comet
Drover
Dynasty
Empire
Flinders
Lavish
Newburg
Rockford
Souris
Taipan

POTATOES

Dakota Crisp
Dakota Pearl
Dakota Rose
Dakota Russet
Dakota Trailblazer

PULSES

ND Dawn
ND Eagle

RYE

ND Dylan
ND Gardner

SOYBEANS

Blue Horizon
ND Dickey
ND Rolette
ND Stutsman
ND17009GT
Traill

WHEAT

Barlow
Elgin-ND
Faller
Glenn
Mott
ND VitPro
Prosper
Velva

HORTICULTURAL CULTIVARS CONTRIBUTING TO INCOME

Dakota Goldcharm®
Spirea

Prairie Statesman®
Swiss Stone Pine

Dakota Goldrush®
Potentilla

Prairie Expedition®
American Elm

Dakota Sunspot®
Potentilla

Prairie Stature®
Hybrid Oak

Prairie Gem®
Flowering Pear

Prairie Reflection®
Laurel Willow

Prairie Spire®
Green Ash

Spring Welcome®
Magnolia

Dakota Pinnacle®
Asian White Birch

Northern Tribute®
River Birch

Blueberry Delight®
Juniper

Royal Splendor®
Norway Spruce

Copper Curls®
Pekin Lilac

Northern Herald®
Eastern Redbud

Northern Acclaim®
Thornless Honeylocust

Cinnamon Curls®
Dwarf Korean Birch

Prairie Dream®
Paper Birch

Northern Empress®
Japanese Elm

Prairie Horizon®
Manchurian Alder

Hyland Splendor®
Mugo Pine



Spring Welcome® Magnolia



Northern Acclaim®



Dakota Goldcharm®

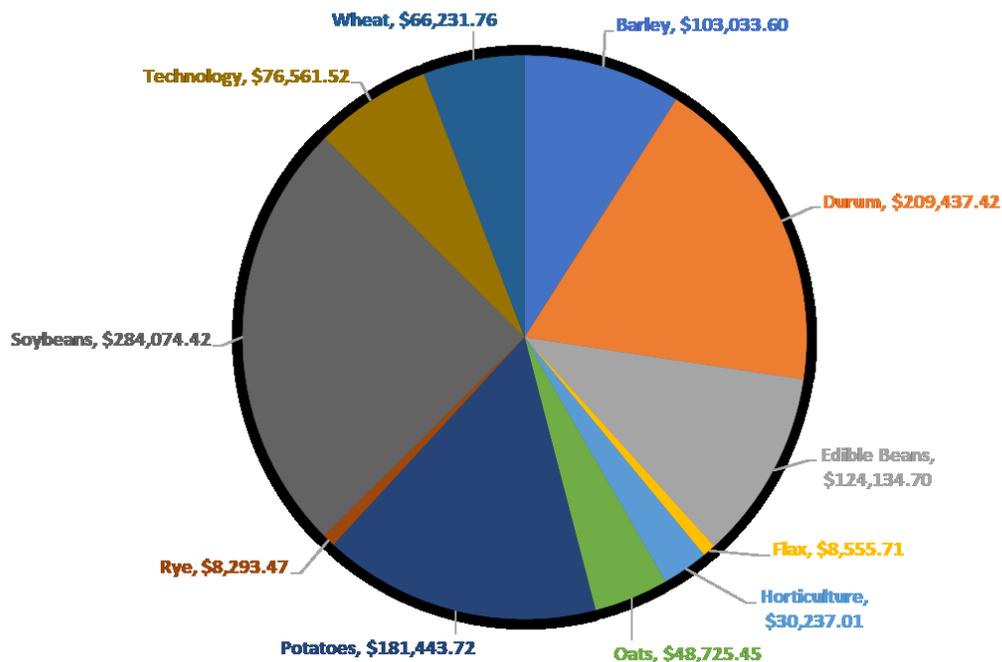
RESEARCH FEES AND ROYALTIES

Research Fees and Royalty Distributions*

Distribution Activity	Barley	Durum	Edible Beans	Flax	Horticulture	Oats	Potatoes	Rye	Soybeans	Technology	Wheat	Grand Total
2D Endow Durum Disbursement		\$140,000										\$140,000
Ag. Experiment Station	\$2,627	\$2,200	\$4,217	\$302	\$11	\$604		\$512	\$345		\$3,122	\$13,939
Breeders	\$34,075	\$32,321	\$44,403		\$9,492	\$24,968	\$52,288	\$4,301	\$3,045		\$40,029	\$244,921
Carrington Research Ext. Ctr.								\$3,266				\$3,266
Chemistry Department										\$11,159		\$11,159
Coatings/Polymers Department										\$5,963		\$5,963
College of Engineering										\$5,053		\$5,053
College of Science & Mathematic										\$6,911		\$6,911
Electrical & Computer Eng Dept										\$1,263		\$1,263
Entomology Department											\$19	\$19
Foundation Seedstocks	\$2,269	\$2,200	\$3,129	\$302		\$130		\$215	\$9,505		\$3,122	\$20,873
Industrial & MFG Eng Dept										\$3,789		\$3,789
Inventors							\$14,599			\$28,030		\$42,628
Langdon Res. Ext Center							\$2,626					\$2,626
ND Barley Council	\$5,440											\$5,440
ND Soybean Council									\$16,409			\$16,409
Physics Dept										\$5,368		\$5,368
Plant Pathology Department	\$8,572	\$2,374	\$10,532				\$47,202		\$19,045		\$7,265	\$94,990
Plant Sciences Dept	\$50,050	\$30,343	\$47,572	\$7,952	\$20,734	\$23,023	\$64,729		\$225,963		\$12,674	\$483,039
Soil Science Dept.									\$9,361			\$9,361
University of IL									\$403			\$403
USDA			\$14,282									\$14,282
VP RCA										\$9,025		\$9,025
Grand Total	\$103,034	\$209,437	\$124,135	\$8,556	\$30,237	\$48,725	\$181,444	\$8,293	\$284,074	\$76,562	\$66,232	\$1,140,729

*rounded to the nearest dollar

RESEARCH FEE AND ROYALTY INCOME



NDSU RESEARCH FOUNDATION
STATEMENT OF FINANCIAL ACTIVITIES—AUDITED

Ordinary Income/Expense

Income

Foundation

Research Fee/Royalty Payments	1,486,346.88
Other Operating Income	70,993.33
Foundation Interest Income	<u>126.30</u>

Total Foundation 1,557,466.51

Endowment

ADHM Endow Inc.	0.50
Math Endow Inc.	0.34
CSM Endow Inc.	0.12
NDSU/RF Endow Income	59,271.43
Spring Wheat Endowment	77,117.78
Durum Endowment	<u>40,023.84</u>

Total Endowment 176,414.01

Total Income 1,733,880.52

Gross Profit 1,733,880.52

Expense

Government/Regulatory Fees 72.00

Miscellaneous Expense 56.00

Legal & Related Expenses 292,845.00

Distributions

PS Endowment

2D Endow Durum Disbursement 140,000.00

Total PS Endowment 140,000.00

Other Distributions

University of IL 403.25

USDA 14,282.02

Total Other Distributions 14,685.27

Creator Distributions

Inventors 42,628.26

Breeders 244,921.15

Total Creator Distributions 287,549.41

ND Commodity Group Distribution

ND Soybean Council 16,408.56

ND Barley Council 5,440.23

Total ND Commodity Group Distribution 21,848.79

NDSU RESEARCH FOUNDATION
STATEMENT OF FINANCIAL ACTIVITIES—AUDITED
(continued)

NDAES/Ext Distributions		
Plant Sciences Dept		483,039.01
Soil Science Dept.		9,360.55
Plant Pathology Department		94,990.22
Langdon Res. Ext Center		2,625.56
Foundation Seedstocks		20,873.46
Entomology Department		19.43
Carrington Research Ext. Ctr.		3,265.93
Ag. Experiment Station		<u>13,939.31</u>
Total NDAES/Ext Distributions		628,113.47
NDSU Distributions		
VP RCA		9,025.13
College of Science & Mathematic		6,910.71
College of Engineering		5,052.65
Coatings/Polymers Department		5,963.34
Chemistry Department		11,158.92
Industrial & MFG Eng Dept		3,789.49
Electrical & Computer Eng Dept		1,263.16
Physics Dept		<u>5,368.44</u>
Total NDSU Distributions		<u>48,531.84</u>
Total Distributions		1,140,728.78
Administrative Expenses		<u>301,717.83</u>
Total Expense		<u>1,735,419.61</u>
Net Ordinary Income		-1,539.09
Other Income/Expense		
Other Income		
Net Gain/Loss on Investments		
BSBT		-284,496.97
2D Endow Gain/Loss		-333,082.11
2W Endow Gain/Loss		-655,189.85
Vanguard Gain/Loss		<u>-125,919.86</u>
Total Net Gain/Loss on Investments		<u>-1,398,688.79</u>
Total Other Income		<u>-1,398,688.79</u>
Net Other Income		<u>-1,398,688.79</u>
Net Income		<u>-1,400,227.88</u>

**NDSU RESEARCH FOUNDATION
STATEMENT OF FINANCIAL POSITION—AUDITED**

ASSETS

Current Assets

Checking/Savings 274,946.23

Other Current Assets

Prepaid Expenses

Prepaid Database Service 7,184.70

Prepaid Insurance 2,673.45

Total Prepaid Expenses 9,858.15

Total Other Current Assets 9,858.15

Total Current Assets 284,804.38

Other Assets

(1) NDSU/RF Endowment

Bell State Bank & Trust

BSBT Bison Fund 668,688.28

BSBT STL SUB 323,624.63

BSBT RF Agency 1,222,606.66

Total Bell State Bank & Trust 2,214,919.57

Vanguard-S&P 500 Fund 930,760.46

Total (1) NDSU/RF Endowment 3,145,680.03

(3) Plant Sciences Endowment

2D Endow Durum 2,498,705.77

2W Endow Spring Wheat 4,824,789.57

Total (3) Plant Sciences Endowment 7,323,495.34

(8) Math Endow 3,976.11

(9) College of Science and Math 1,793.33

Total Other Assets 10,474,944.81

TOTAL ASSETS **10,759,749.19**

LIABILITIES & EQUITY

Liabilities

Current Liabilities

Accounts Payable 17,021.65

Other Current Liabilities

Accrued Payroll Expense 367.65

Total Other Current Liabilities 367.65

Total Current Liabilities 17,389.30

Total Liabilities 17,389.30

NDSU RESEARCH FOUNDATION
STATEMENT OF FINANCIAL POSITION—AUDITED
(continued)

Equity	
Designated for Plant Science	
(2) PS Endowment 2W End	5,375,581.54
(3) PS Endowment 2DEnd	<u>2,931,764.04</u>
Total Designated for Plant Science	8,307,345.58
Designated for Endowment	
NDSU RF/Endowment	<u>3,508,255.00</u>
Total Designated for Endowment	3,508,255.00
Designated for ADHM	-0.46
Designated for Math	3,975.77
Designated for Science & Math	1,933.21
Research Foundation	321,079.00
Retained Earnings	-0.33
Net Income	<u>-1,400,227.88</u>
Total Equity	<u>10,742,359.89</u>
TOTAL LIABILITIES & EQUITY	<u>10,759,749.19</u>

NDSURF BOARD OF DIRECTORS

Dave Cook, President

Richard Rayl, Vice President

Colleen Fitzgerald, Treasurer

Greg Lardy, Secretary

Margaret Fitzgerald

Michael Kessler

Mark Birdsall

Katie Hasbargen

James Broten

Rodney Howe

*Dean Bresciani, President

*Jane Schuh, Treasurer

*Randall Herman

*Joel Honeyman

*Stephen Herrmann

*Outgoing members in FY22