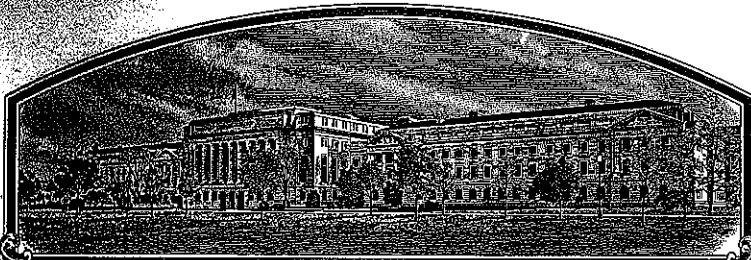


No.

200200157



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

University of Idaho

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE HERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

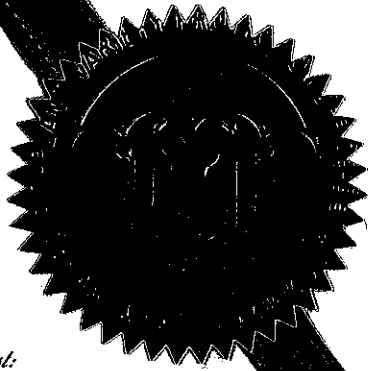
NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR PROPAGATING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE FOREGOING PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

POTATO

'Ivory Crisp'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this second day of October, in the year two thousand and eight.

Attest:



Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
 AGRICULTURAL MARKETING SERVICE
 SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
 (Instructions and information collection burden statement on reverse)

1. NAME OF OWNER University of Idaho		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME ND01496-1	3. VARIETY NAME Ivory Crisp
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) Idaho Agricultural Experiment Station University of Idaho Moscow, ID 83843-4196		5. TELEPHONE (include area code) (208)885-7173	FOR OFFICIAL USE ONLY VPVO NUMBER 200200157 FILING DATE 05/10/02
		6. FAX (include area code) (208)885-6654	
7. IF THE OWNER NAMED IS NOT A "PERSON". GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) Land Grant University	8. IF INCORPORATED, GIVE STATE OF INCORPORATION	9. DATE OF INCORPORATION	
10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) Stephen L. Love Aberdeen R&E Center PO Box 870 Aberdeen, ID 83210			FILING AND EXAMINATION FEES: \$ 2705 DATE 05/10/02 CERTIFICATION FEE: \$ 768.00 DATE Aug. 25, 2008

11. TELEPHONE (Include area code) (208)397-4181	12. FAX (Include area code) (208)397-4311	13. E_MAIL slove@uidaho.edu	14. CROP KIND (Common Name) Potato
15. GENUS AND SPECIES NAME OF CROP Solanum Tuberosum		16. FAMILY NAME (Botanical) Solanaceae	17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d. <input type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,450, made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office))	19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? See Section 83(a) of the Plant Variety Protection Act <input type="checkbox"/> YES (If "yes", answer items 20 and 21 below) <input checked="" type="checkbox"/> NO (If "no," go to item 22) per letter 4-2-08 LMC
	20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> YES <input type="checkbox"/> NO
21. IF "YES" TO ITEM 20, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED	

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES? <input checked="" type="checkbox"/> YES MARCH, 2002 per letter 4-02-08 <input type="checkbox"/> NO LMC 4-21-08 IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse.)	23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)
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24. The owners declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Owner(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER 		SIGNATURE OF OWNER	
NAME (Please print or type) Richard C. Heimsch		NAME (Please print or type)	
CAPACITY OR TITLE Assoc. Dean/Director	DATE 5/6/2002	CAPACITY OR TITLE	DATE

INSTRUCTIONS

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), ALL of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to reproduce the variety, or for tuber reproduced varieties verification that a viable (in the sense that it will reproduce an entire plant) tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for \$3,652 (\$432 filing fee and \$3,220 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice.) Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfilled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. DO NOT use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of \$432 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office
Telephone: (301) 504-5518
FAX: (301) 504-5291

Homepage: <http://www.ams.usda.gov/science/pvpo/pvpindex.htm>

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority and provide evidence that name has been cleared by the appropriate recognized authority before the Certificate of Protection is issued. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, 10301 Baltimore Avenue, Suite 401 NAL Building, Beltsville, MD 20705. Telephone: (301) 504-5682 <http://www.ams.usda.gov/lsg/seed.htm>.

ITEM

- 19a. Give:
 - (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
 - (2) the details of subsequent stages of selection and multiplication;
 - (3) evidence of uniformity and stability; and
 - (4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified
- 19b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
 - (1) identify these varieties and state all differences objectively;
 - (2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
 - (3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 19c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 19d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 19e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
- 20. If "Yes" is specified (seed of this variety be sold by variety name only, as a class of certified seed), the applicant MAY NOT reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See Regulations and Rules of Practice, Section 97.103).
- 23. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
- 24. See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.

22. CONTINUED FROM FRONT (Please provide a statement as to the limitation and sequence of generations that may be certified.)

23. CONTINUED FROM FRONT (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)

24. CONTINUED FROM FRONT (Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. The fees for filing a change of address; owner's representative; ownership or assignment; or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 1.4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, sexual orientation, marital or family status, political beliefs, parental status, or protected genetic information. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

Exhibit A

Origin and Breeding History of the Variety

Variety: Ivory Crisp

Experimental Designation: NDO1496-1

Owner: University of Idaho

Ivory Crisp originated from a cross of ND292-1 and A77268-4 made at North Dakota State University in 1980. It was shipped to Oregon State University as an unselected seedling in 1984 where it went through 4 years of selection and evaluation. In 1988, Ivory Crisp was tested in Idaho as part of the Western Regional Variety Trial. Due to outstanding performance in Idaho production areas, Oregon State University passed the rights to the variety to the University of Idaho. The University of Idaho is the designated owner of the variety and will represent the interests of all concerned parties including Oregon State University, Washington State University, and North Dakota State University. Ivory Crisp was originally maintained under the breeding designation NDO1496-1. A four-generation pedigree is attached. Ivory Crisp was selected out of an F₁ population using the following selection criteria: appearance, yield, specific gravity, chip quality and cold chipping ability, resistance to common field diseases including Verticillium wilt, early blight, and net necrosis, and resistance to physiological and disease problems that cause product defects such as hollow heart, blackspot bruise, tuber rots, shatter cracking, vascular discoloration, and heat necrosis.

Ivory Crisp has been clonally propagated since the first year of selection. In this situation variability will occur only as mutants or chimaeras. Ivory Crisp has remained completely free of any visibly detectable variants during all subsequent years of maintenance and propagation. Ivory Crisp is uniform and stable and has remained so through 14 years of evaluation in the Idaho variety development program.

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NDO1496-1

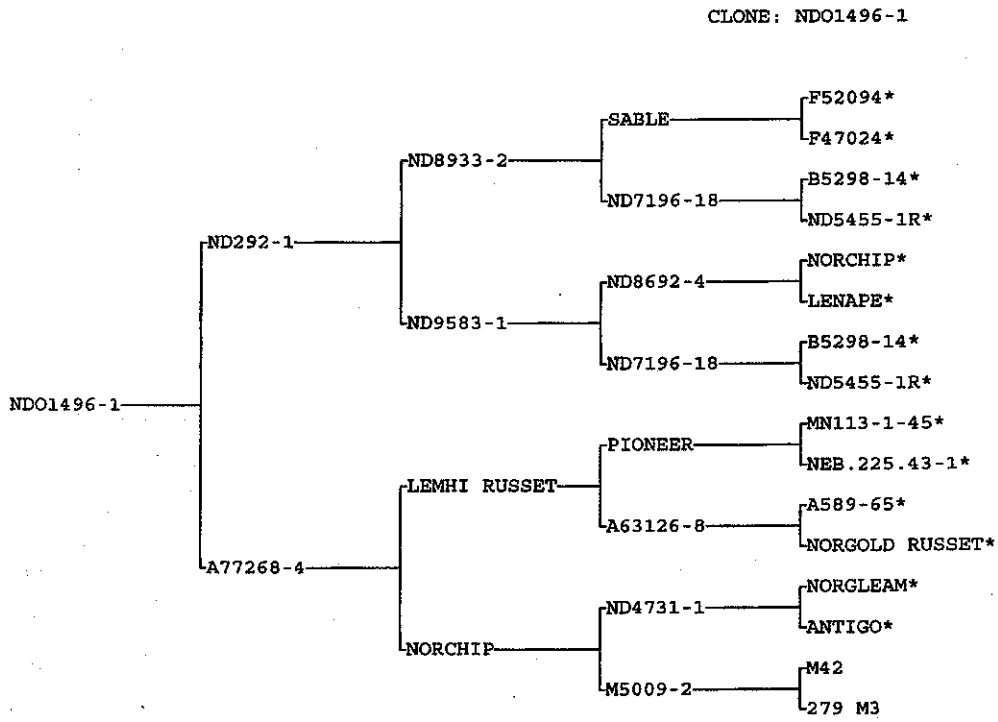


Figure 1. Pedigree for NOD1496-1.

Exhibit B

Statement of Distinctness**Variety:** Ivory Crisp**Owner:** University of Idaho

Ivory Crisp is most similar Atlantic, the variety most commonly grown in the US for the chipping market. In direct comparisons with Atlantic, Ivory Crisp has produced lighter chip color following storage at both 40 and 50 F (See table below).

Morphological differences between Atlantic and Ivory Crisp were documented in Exhibit C and demonstrated in the color plates provided. Compared with Atlantic, Ivory Crisp has a more spreading growth habit (7-spreading vs 3-erect), a more closed leaf silhouette (1-closed vs 3-medium), less leaflet margin waviness (2-slight vs 3-weak), fewer secondary and tertiary leaflet pairs (3.3, range 0-7 vs 5.9, range 2-12), different flower color (RHSCC white 155A vs purple 76D), more florets per inflorescence (20.2, range 8-36 vs 13.4, range 9-23), and more flowers per plant (3.7, range 1-7 vs 2.3, range 1-4).. Ivory crisp tubers (vs Atlantic) have lighter skin color (1-white vs 4-buff; RHSCC color chart yellow-white 158B vs gray-yellow 167B), smoother skin texture (1-smooth vs 2-rough[flaky]), shallower eyes (3-shallow vs 4-intermediate), and a greater number of eyes per tuber (13.3, range 9-26 vs 9.7, range 5-14). Other morphological differences are evident as recorded in Exhibit C.

Comparison of chip color and hollow heart of Ivory Crisp with those of Atlantic.¹

Variety	Chip Color ²	
	40 F	50 F
Ivory Crisp	2.0	0.9
Atlantic	2.6	1.4
LSD (.05)	0.3	0.2

¹Analysis for all chip color and hollow heart includes data accumulated at Aberdeen, Idaho in 1988, 1989, 1990, 1992, and 1994 and combined for analysis. The trials were designed as typical one-row variety trials with four replications, 20-foot plots, and 24 plants per plot (N=20 for each variety).

²Chip color was determined using tubers stored for 3 months at 40 or 50°F. Chip color was rated using a modified version of the Snack Food Association color chart wherein 0=light, attractive color, 5=dark, unattractive color.

Protocols for determination of chip color and incidence of hollow heart.

General

Tuber samples for chip color and hollow heart assessments were procured from variety trials grown at Aberdeen, Idaho in 1988, 1989, 1990, 1992, and 1994. The varieties were grown on single-row, twenty foot plots, replicated four times.

Chip color

Samples consisting of three tubers from each replication of a field trial are stored at 40 or 50 F for approximately 3 months.

Tubers are sliced to the appropriate thickness (0.5 mm), rinsed, and cooked at 350 F in vegetable oil until all water is displaced in the tuber tissue. The chips are then rated for color using the Snack Food Association visual rating scale. The scale is from 0 to 5 with lower numbers indicating lighter color and two or less being acceptable.

Hollow heart

Ten tubers, weighing more than 12 oz, from each replication of a field trial are cut along the longitudinal axis and visually inspected for hollow heart. Incidence is reported as a percentage of affected tubers within the sample.

The ANOVA Procedure

Class Level Information

Class	Levels	Values
year	5	88 89 90 92 94
rep	4	1 2 3 4
variety	2	atl ic

Number of observations 40

The ANOVA Procedure

Dependent Variable: chip40

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	24	34.38250000	1.43260417	6.93	0.0002
Error	15	3.10125000	0.20675000		
Corrected Total	39	37.48375000			

R-Square	Coeff Var	Root MSE	chip40 Mean
0.917264	19.66260	0.454698	2.312500

Source	DF	Anova SS	Mean Square	F Value	Pr > F
year	4	27.17250000	6.79312500	32.86	<.0001
rep	3	0.34475000	0.11491667	0.56	0.6522
year*rep	12	2.92150000	0.24345833	1.18	0.3767
variety	1	3.66025000	3.66025000	17.70	0.0008
year*variety	4	0.28350000	0.07087500	0.34	0.8449

Tests of Hypotheses Using the Anova MS for year*rep as an Error Term

Source	DF	Anova SS	Mean Square	F Value	Pr > F
year	4	27.17250000	6.79312500	27.90	<.0001

The ANOVA Procedure

Dependent Variable: chip50

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	24	6.59150000	0.27464583	4.18	0.0030
Error	15	0.98625000	0.06575000		
Corrected Total	39	7.57775000			

R-Square	Coeff Var	Root MSE	chip50 Mean
0.869849	22.44356	0.256418	1.142500

Source	DF	Anova SS	Mean Square	F Value	Pr > F
year	4	2.47150000	0.61787500	9.40	0.0005
rep	3	0.25875000	0.08625000	1.31	0.3073
year*rep	12	1.20250000	0.10020833	1.52	0.2181
variety	1	2.35225000	2.35225000	35.78	<.0001
year*variety	4	0.30650000	0.07662500	1.17	0.3650

Tests of Hypotheses Using the Anova MS for year*rep as an Error Term

Source	DF	Anova SS	Mean Square	F Value	Pr > F
year	4	2.47150000	0.61787500	6.17	0.0062

The ANOVA Procedure

Dependent Variable: hh

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	24	11065.00000	461.04167	4.29	0.0026
Error	15	1612.50000	107.50000		
Corrected Total	39	12677.50000			

R-Square	Coeff Var	Root MSE	hh Mean
0.872806	112.0889	10.36822	9.250000

Source	DF	Anova SS	Mean Square	F Value	Pr > F
year	4	4265.000000	1066.250000	9.92	0.0004
rep	3	127.500000	42.500000	0.40	0.7582
year*rep	12	635.000000	52.916667	0.49	0.8890
variety	1	2722.500000	2722.500000	25.33	0.0001
year*variety	4	3315.000000	828.750000	7.71	0.0014

Tests of Hypotheses Using the Anova MS for year*rep as an Error Term

Source	DF	Anova SS	Mean Square	F Value	Pr > F
year	4	4265.000000	1066.250000	20.15	<.0001

The ANOVA Procedure

t Tests (LSD) for chip40

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	15
Error Mean Square	0.20675
Critical Value of t	2.13145
Least Significant Difference	0.3065

Means with the same letter are not significantly different.

t Grouping	Mean	N	variety
A	2.6150	20	atl
B	2.0100	20	ic

The ANOVA Procedure

t Tests (LSD) for chip50

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	15
Error Mean Square	0.06575
Critical Value of t	2.13145
Least Significant Difference	0.1728

Means with the same letter are not significantly different.

t Grouping	Mean	N	variety
A	1.38500	20	atl
B	0.90000	20	ic

The ANOVA Procedure

t Tests (LSD) for hh

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

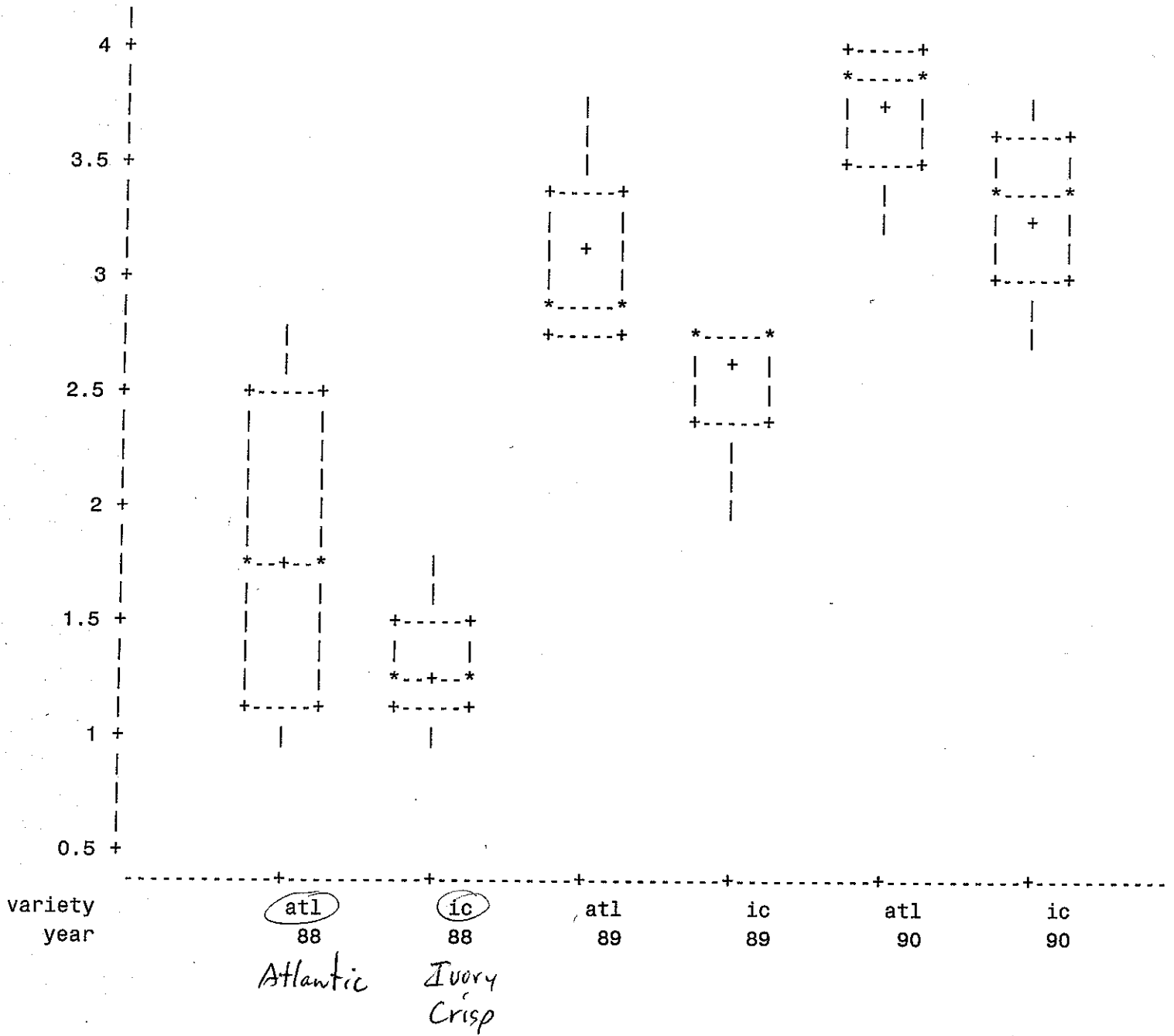
Alpha	0.05
Error Degrees of Freedom	15
Error Mean Square	107.5
Critical Value of t	2.13145
Least Significant Difference	6.9884

Means with the same letter are not significantly different.

t Grouping	Mean	N	variety
A	17.500	20	atl
B	1.000	20	ic

The UNIVARIATE Procedure
Variable: chip40

Schematic Plots

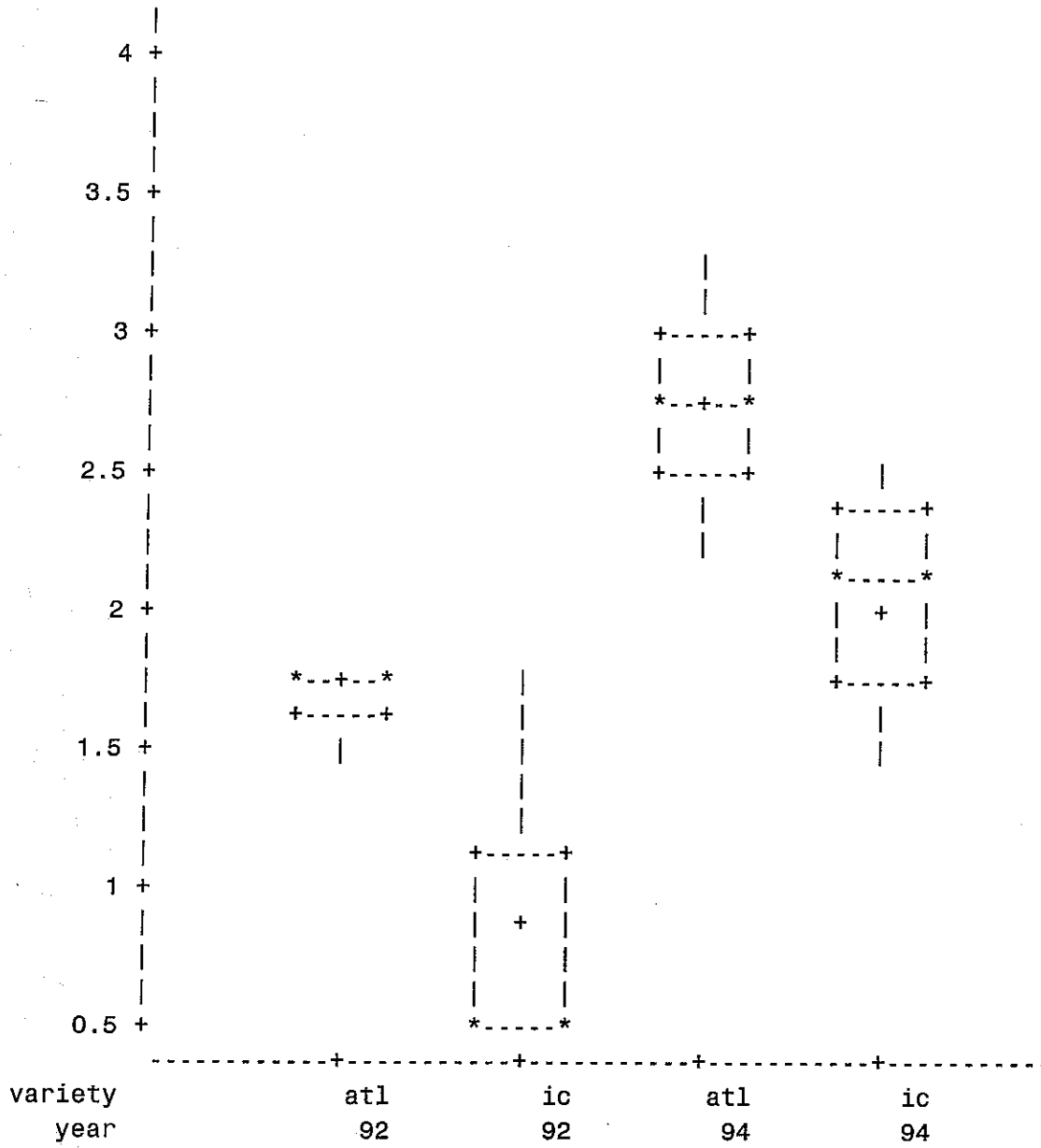


Box plots to illustrate data consistency across years for fry color variables

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The UNIVARIATE Procedure
Variable: chip40

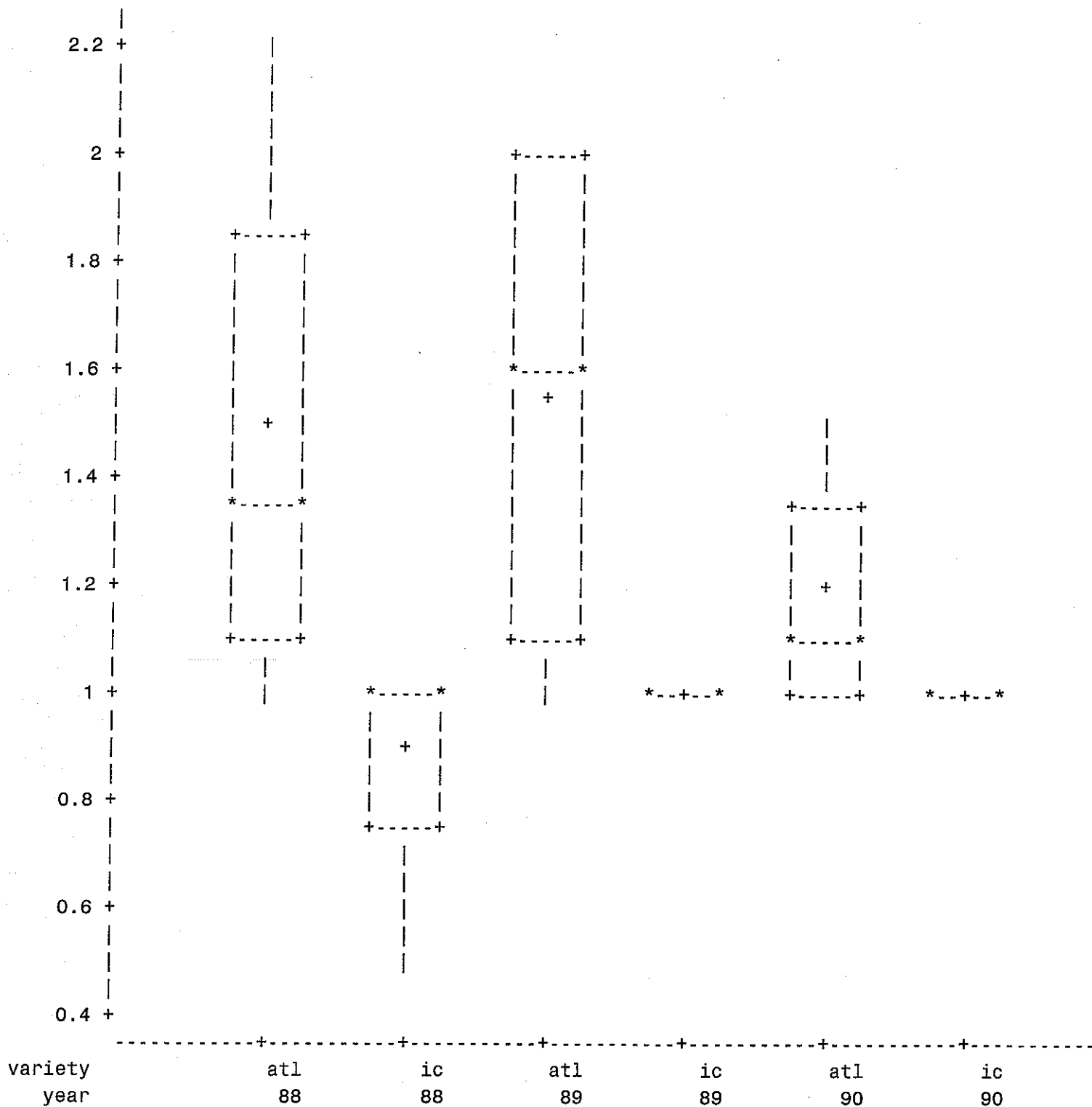
Schematic Plots



#200200157

The UNIVARIATE Procedure
Variable: chip50

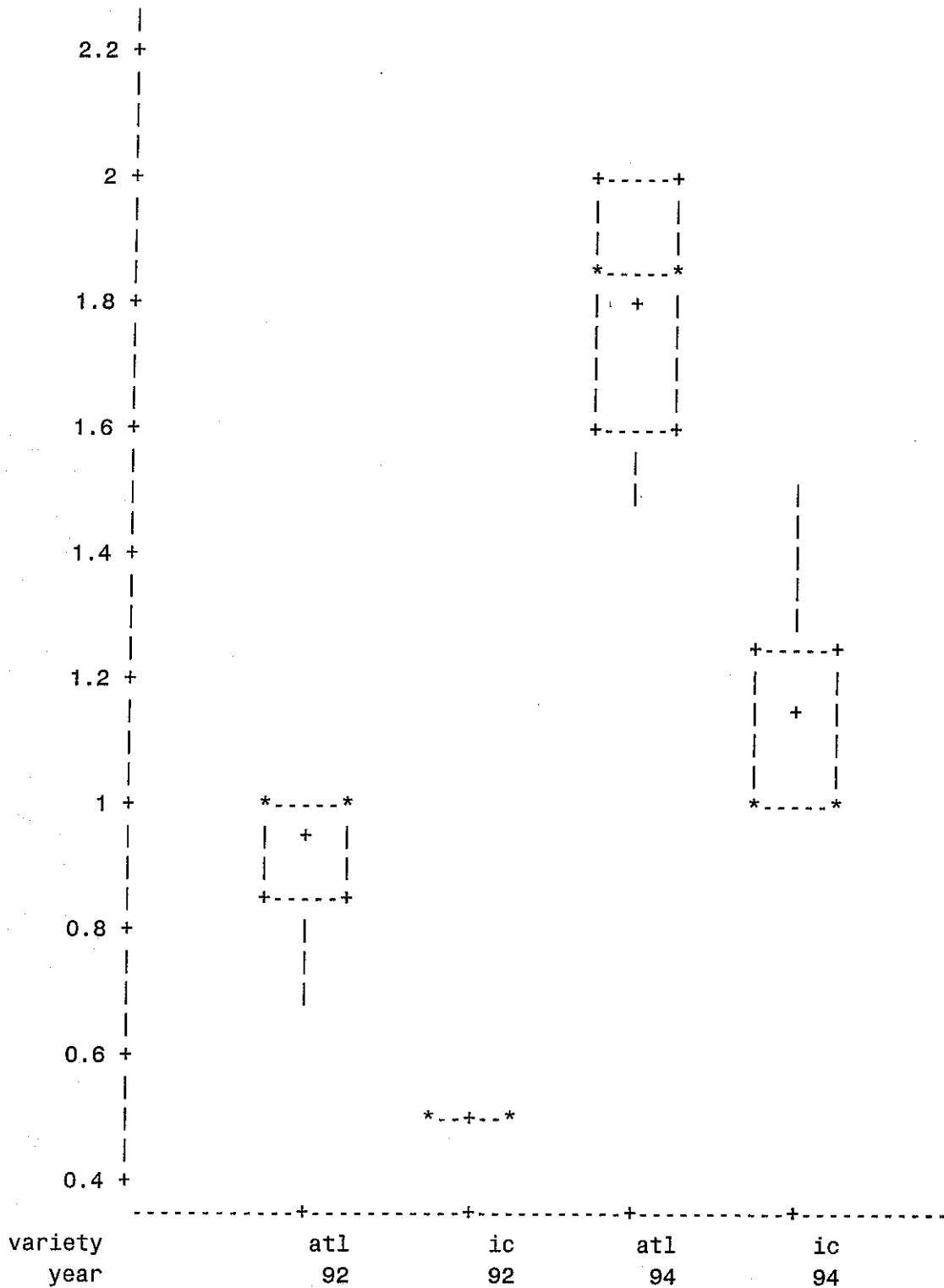
Schematic Plots



#200200157

The UNIVARIATE Procedure
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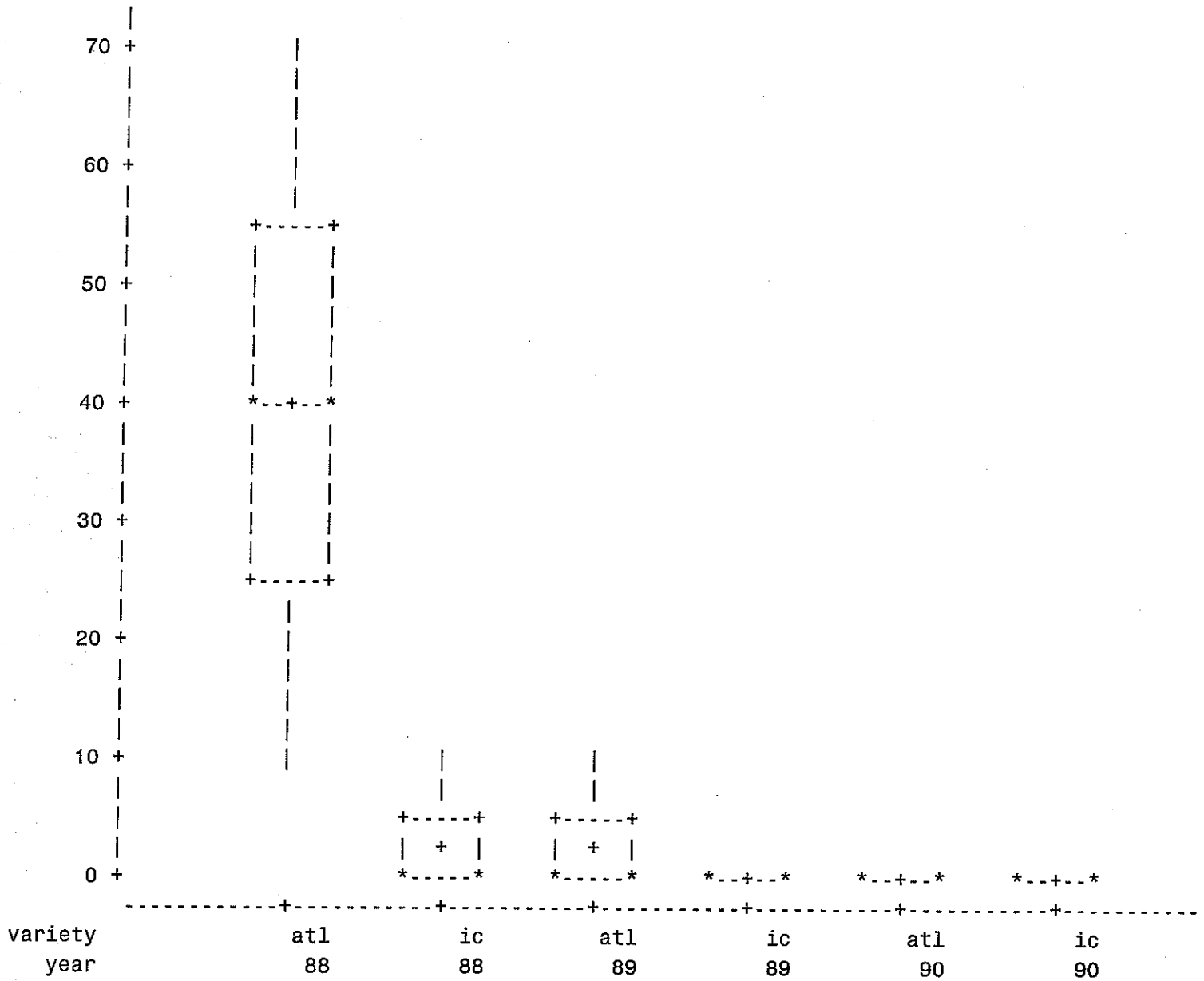
Schematic Plots



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The UNIVARIATE Procedure
Variable: hh

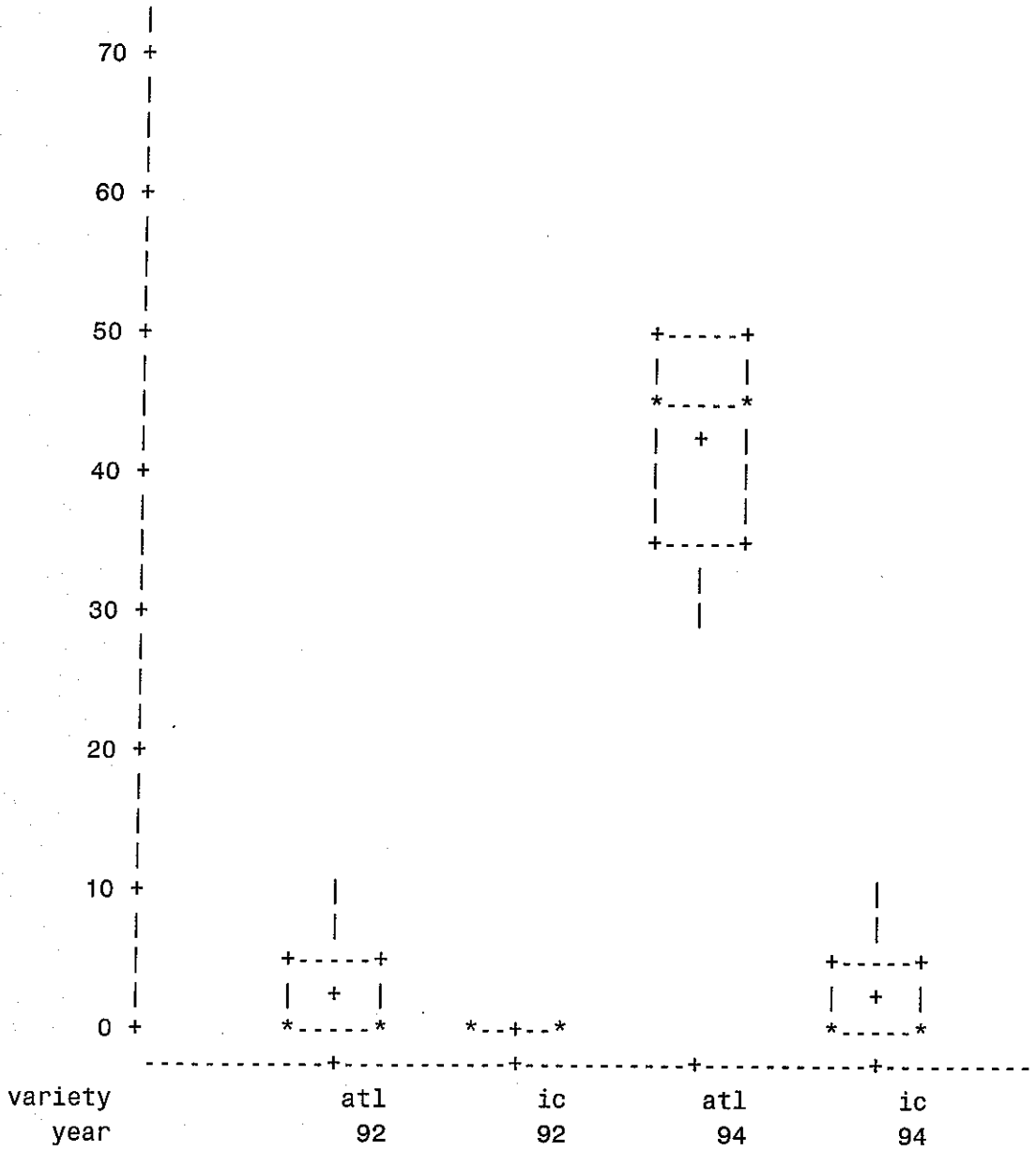
Schematic Plots



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The UNIVARIATE Procedure
Variable: hh

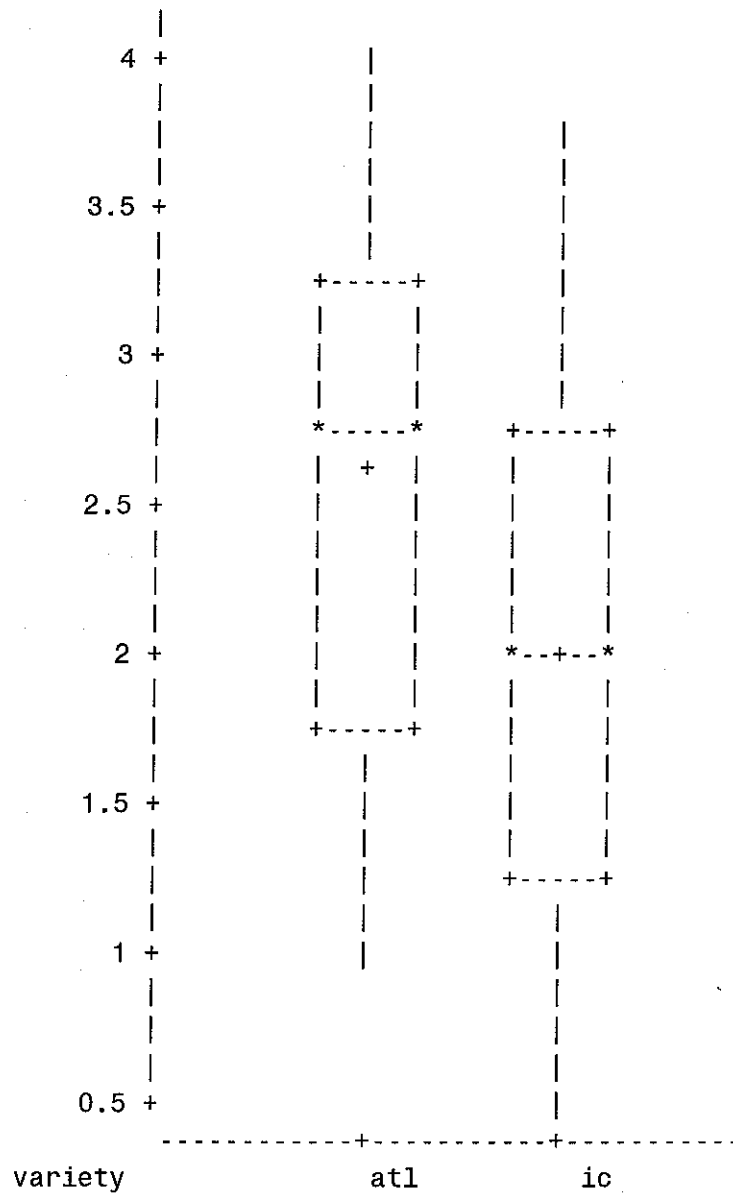
Schematic Plots



The UNIVARIATE Procedure

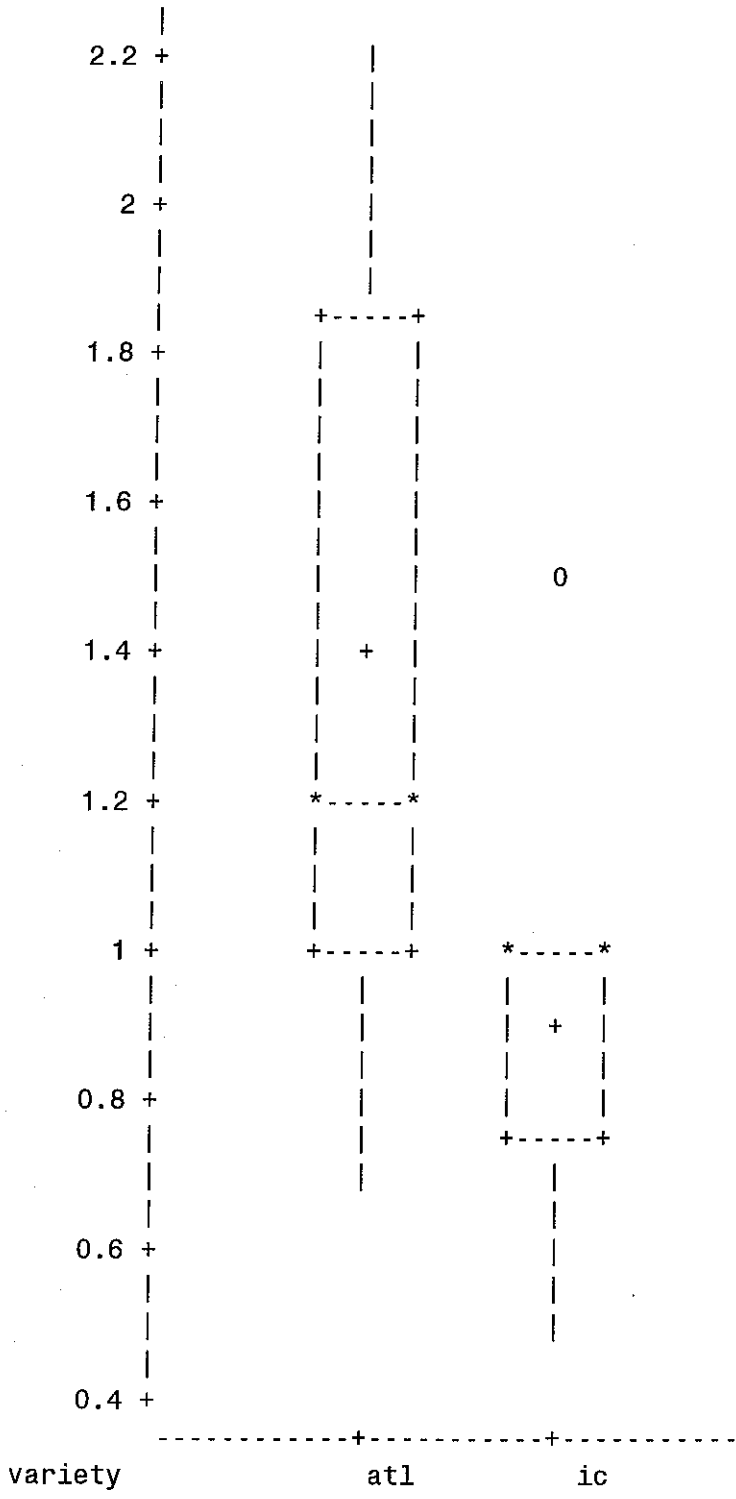
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Schematic Plots



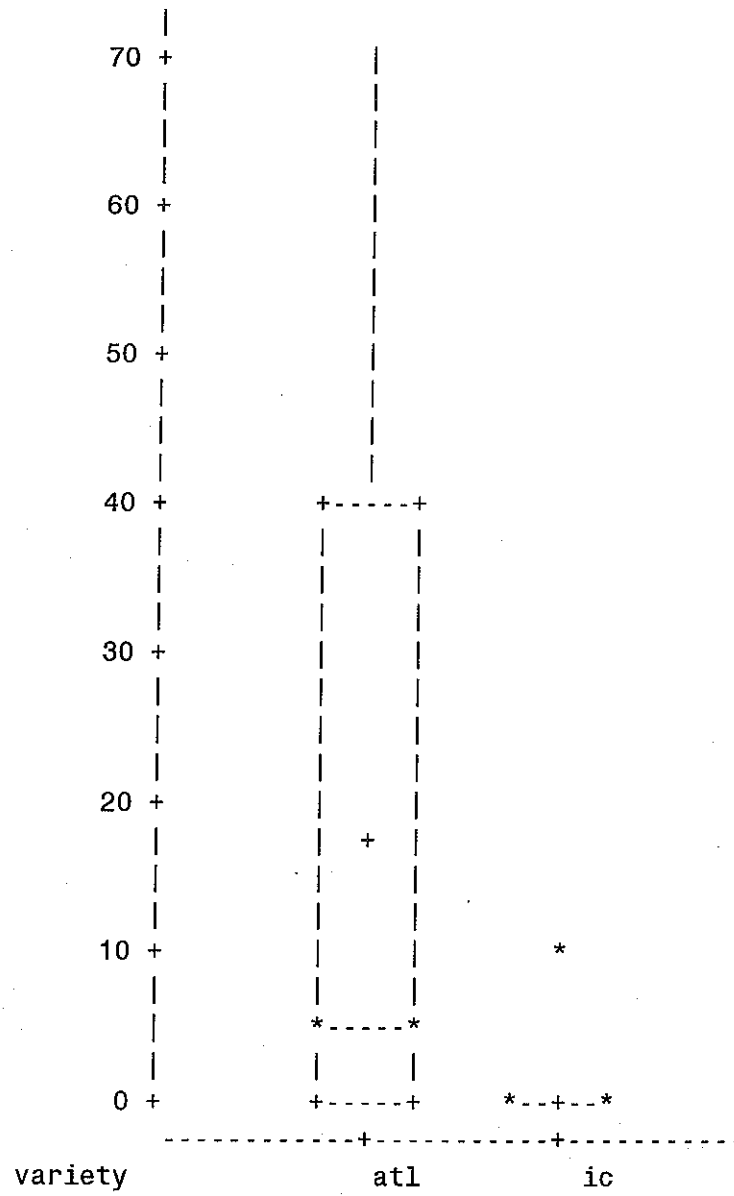
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Variable: chip50

Schematic Plots

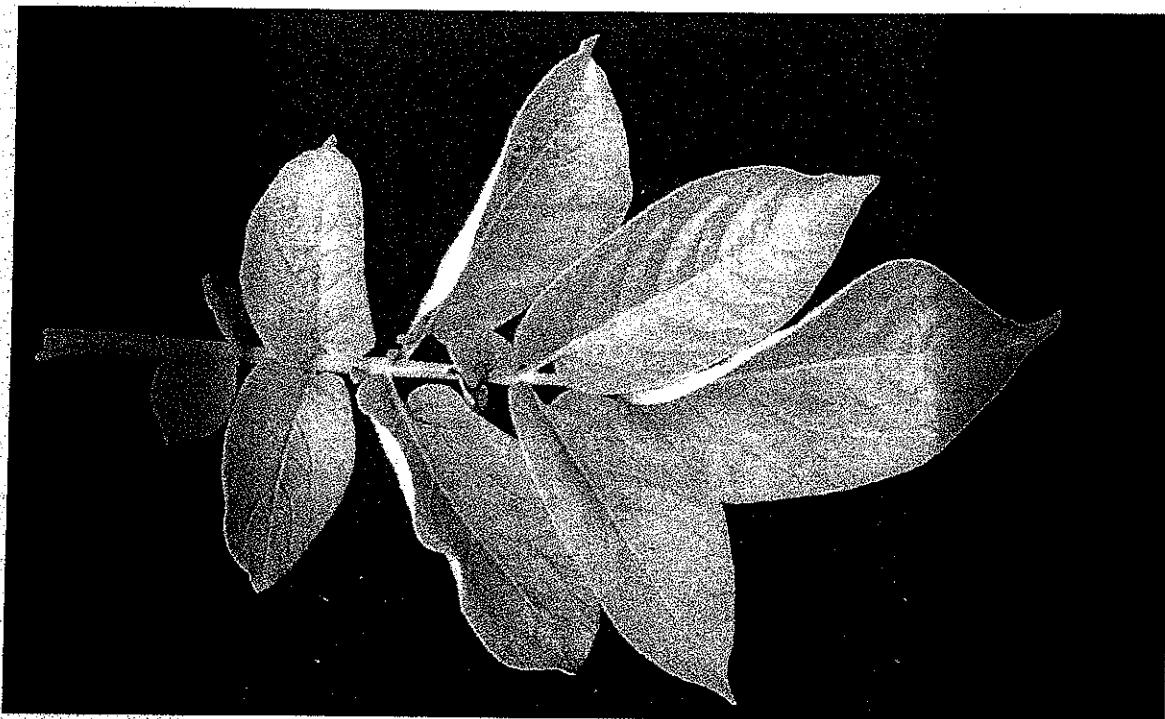


The UNIVARIATE Procedure
Variable: hh

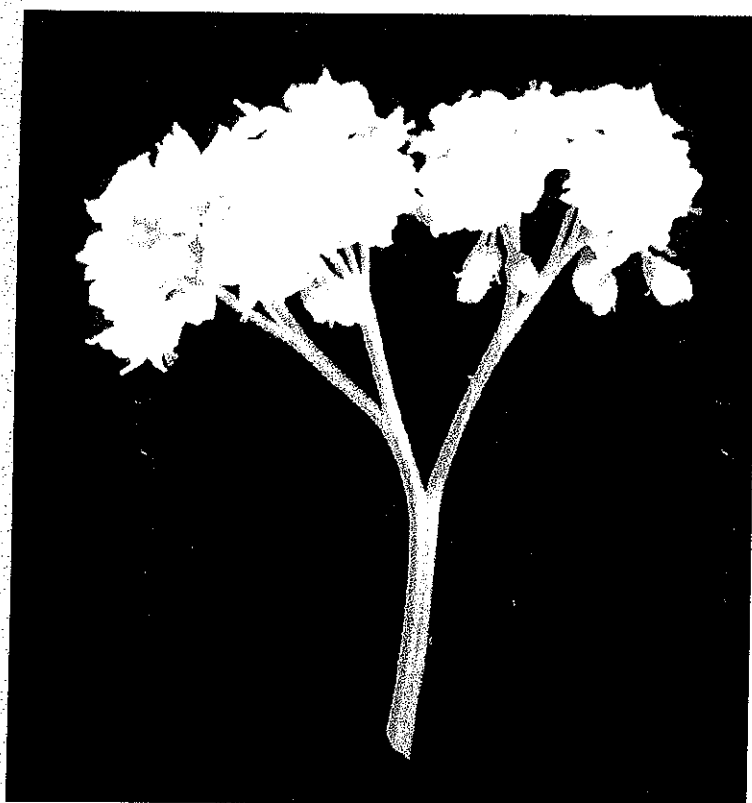
Schematic Plots



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Ivory Crisp - leaf



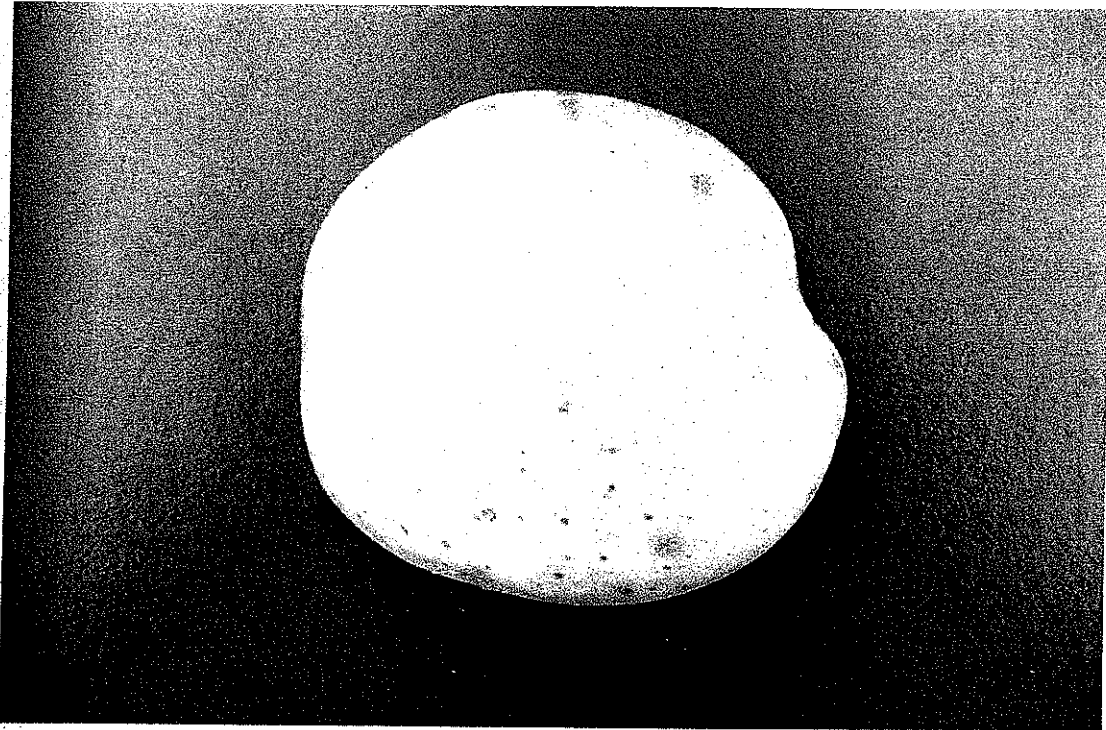
Ivory Crisp - flower

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Ivory Crisp – whole plant

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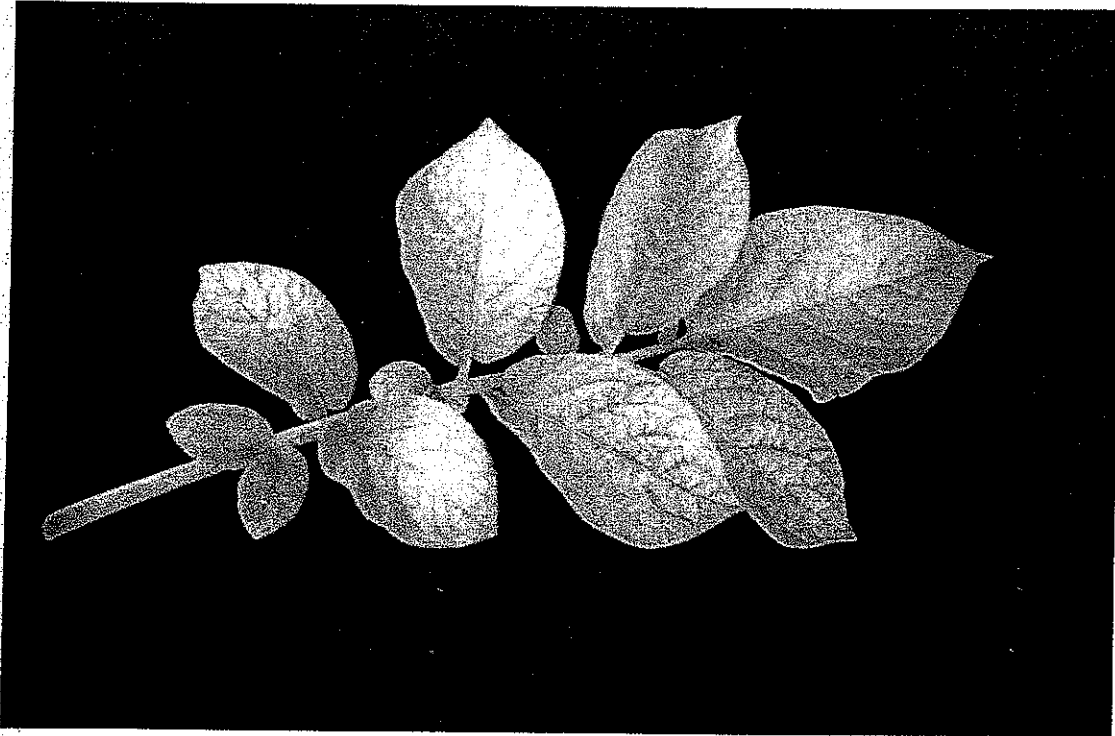


Ivory Crisp - tuber

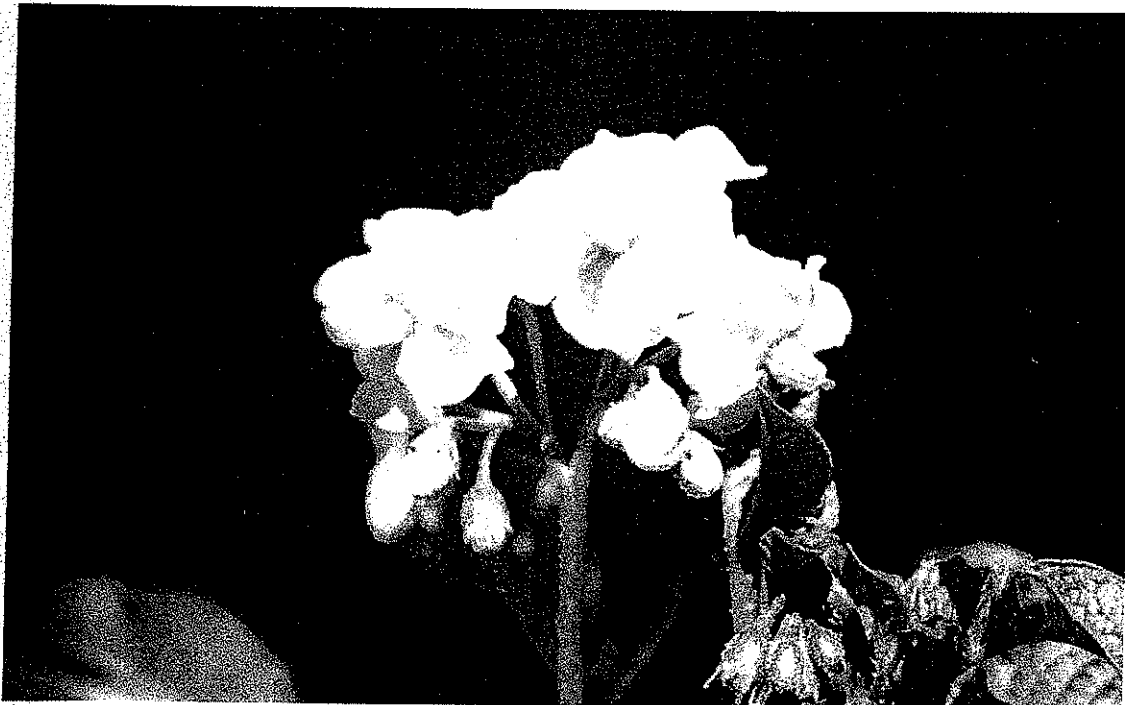


Ivory Crisp— light sprout

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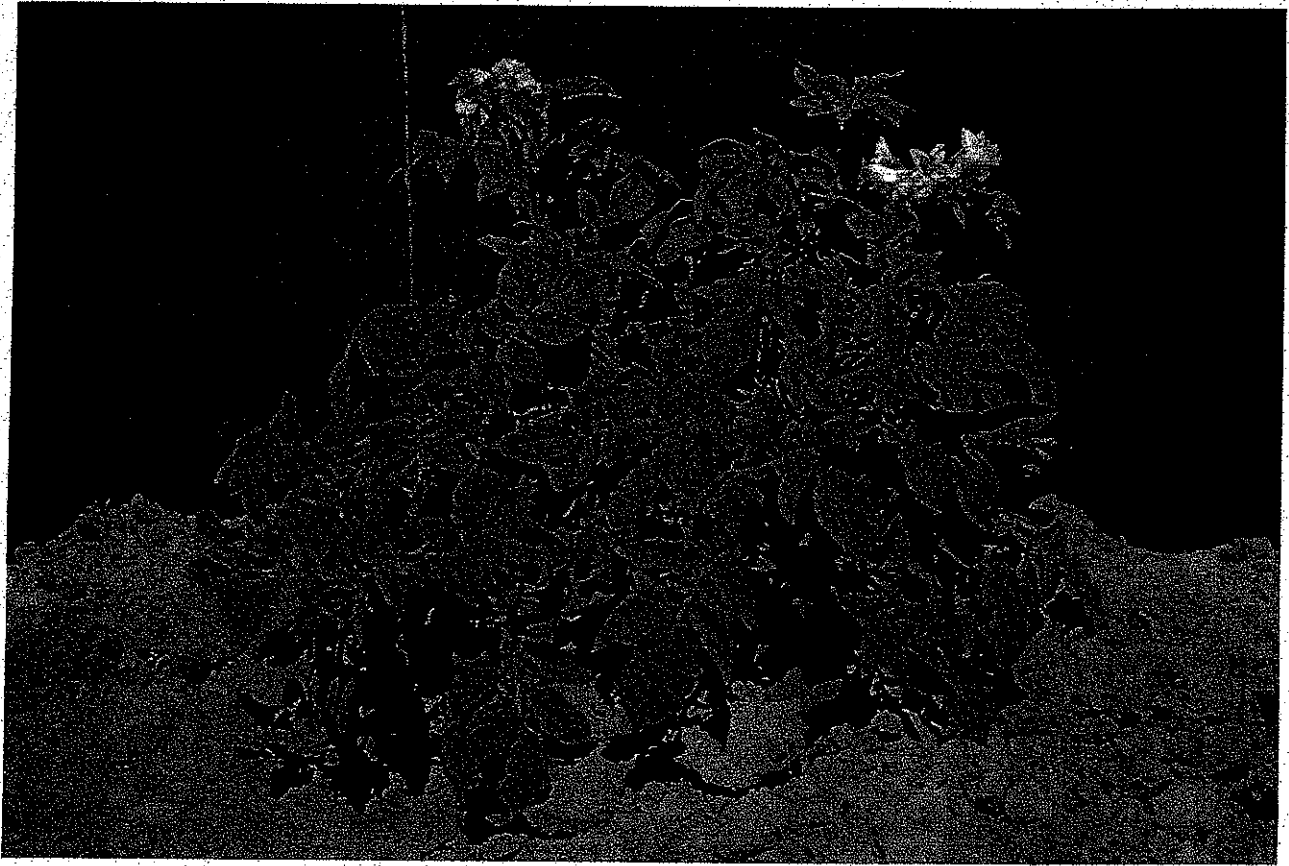


Atlantic - leaf

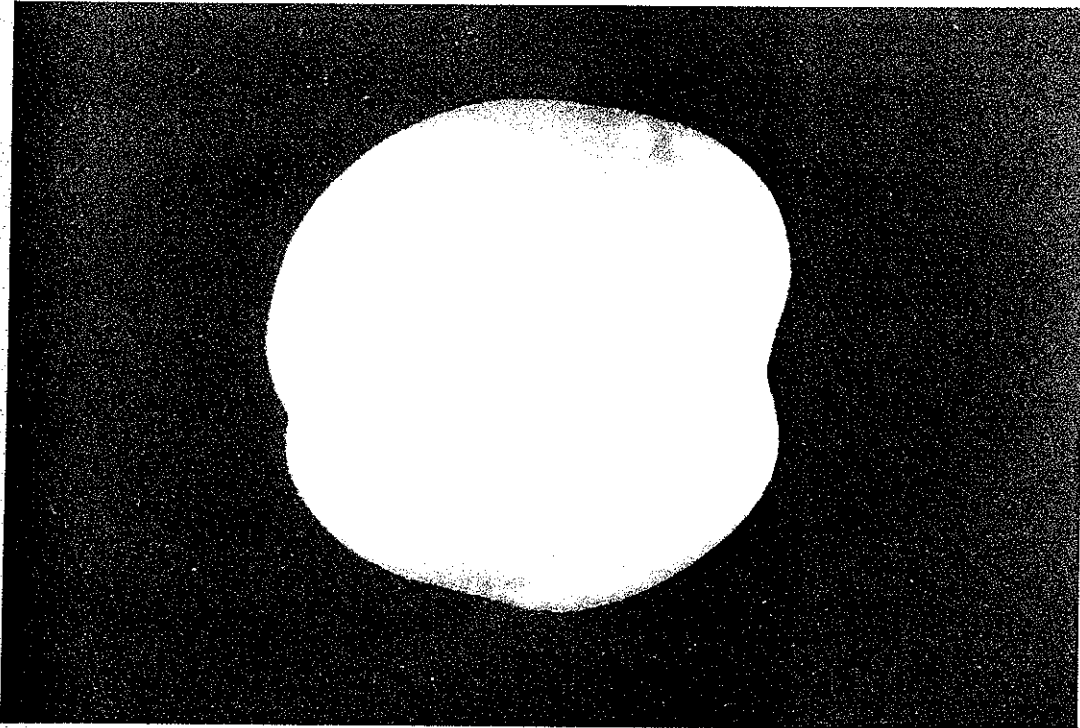


Atlantic - flower

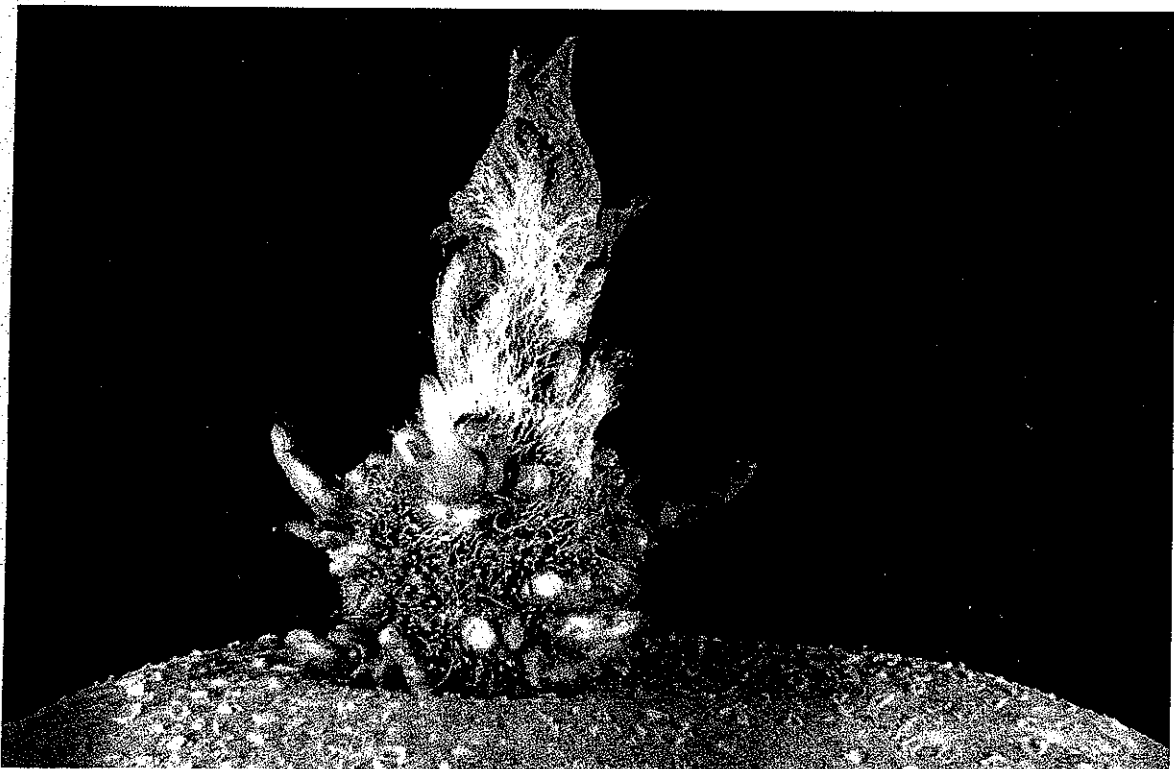
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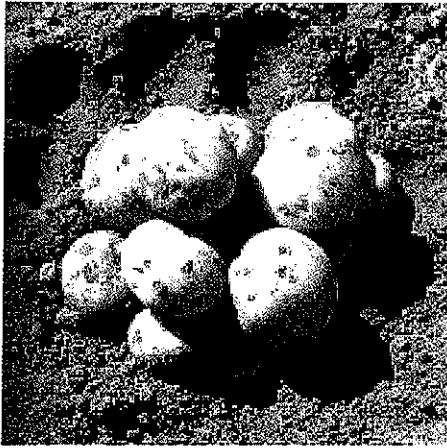
Atlantic – whole plant



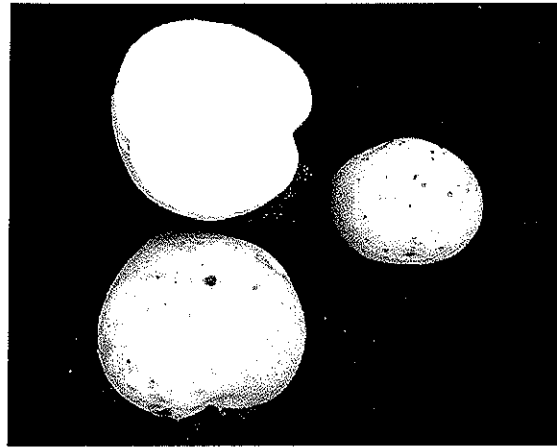
Atlantic - tuber



Atlantic – light sprout



a)



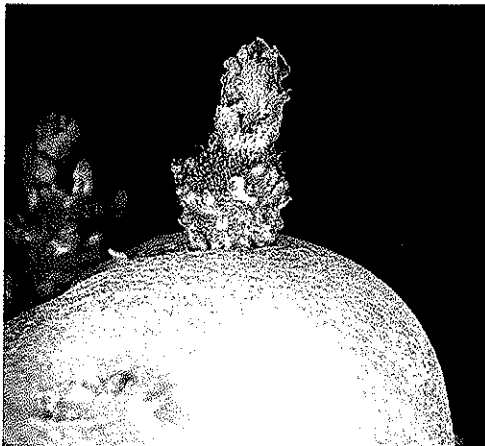
b)



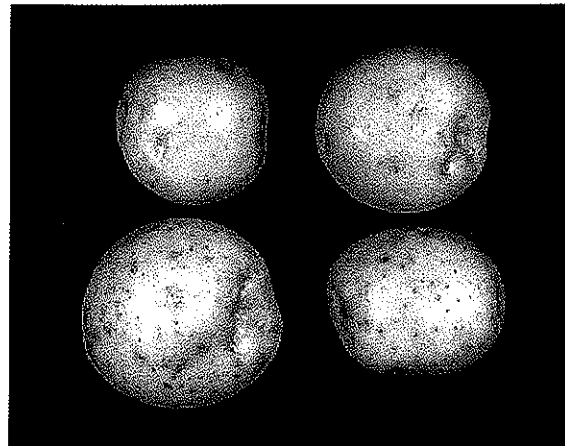
c)



d)



e)



f)

Photographs of Ivory Crisp (NDO1496-1) showing: a) tubers from two plants, b) tuber flesh color, c) compound leaf and flower, d) whole plant, e) sprout, f) four tuber sample.

Ivory Crisp: A Potato Variety with High Tuber Solids and Cold Chipping Ability

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ABSTRACT

Ivory Crisp was released in 2002 by the experiment stations of Idaho, Oregon, Washington, and North Dakota, and by the USDA/ARS. It resulted from a 1980 cross of ND292-1 and A77268-4. Ivory Crisp is suited for use in both the direct delivery and storage chipping markets. Ivory Crisp is a medium-maturing potato variety with round, white tubers and excellent chipping quality. It has medium to high yield potential, high tuber solids, resistance to most internal and external tuber defects, and the ability to chip from cold storage. In trials in Idaho, Oregon, and Washington, total and U.S. No. 1 tuber yield of Ivory Crisp was similar to Atlantic but lower than Chipeta. Yield of tubers in the size range 113-336 g for Ivory Crisp is higher than for either Atlantic or Chipeta. Ivory Crisp is resistant to growth cracks, secondary growth, hollow heart, and stem-end necrosis, but susceptible to shatter bruise. Tuber sugar content has consistently remained low following cold storage and near-acceptable chip color retained at 4.4 C. Ivory Crisp is susceptible or moderately susceptible to most common field diseases of potato. It is highly susceptible to common scab, powdery scab, and pink rot. Tubers of Ivory Crisp have dry matter content (22.4%) lower than those of Atlantic, but higher than those of

Chipeta. Glycoalkaloid content of Ivory Crisp tubers is very low (4.3 mg 100 g⁻¹). An application for Plant Variety Protection has been filed for Ivory Crisp. Seed is available from potato seed growers in Idaho, North Dakota, and Canada. Small amounts of seed, for research purposes, can be obtained by contacting the corresponding author.

RESUMEN

La variedad de papa Ivory Crisp fue liberada en el año 2002 por las estaciones experimentales de Idaho, Oregon, Washington y North Dakota y por el USDA/ARS. Fue el resultado de un cruzamiento en 1980 de ND292-1 y A77268-4. Ivory Crisp es apropiado tanto para usarlo en entrega directa como para los mercados que venden papa cortada almacenada. Es una variedad de maduración en tiempo medio, con tubérculos redondos, blancos y una excelente cualidad de picado. Tiene un potencial de rendimiento mediano a alto, contenido alto de sólidos, resistente a la mayoría de defectos internos y externos del tubérculo, los cuales tienen la propiedad de que pueden ser picados después de extraídos de almacenaje frío. En pruebas hechas en Idaho, Oregon y Washington, el rendimiento total de tubérculos de Ivory Crisp US.No.1 fue similar al de Atlantic, pero más bajo que el de Chipeta. El rendimiento de tubérculos en un rango de 113 a 336g de Ivory Crisp es más alto que el de Atlantic o de Chipeta. Ivory Crisp es resistente a las grietas de crecimiento, al crecimiento secundario, corazón vacío y necrosis de la base del tallo, pero es susceptible a las magulladuras causadas por golpes. El contenido de

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ADDITIONAL KEY WORDS: *Solanum tuberosum*, variety release, cold chipping

Abbreviations: RHSCC = Royal Horticulture Society Color Chart.

azúcar del tubérculo ha permanecido bajo después del almacenaje en frío y ha sido retenido un color más aceptable a 4.4 C. Ivory Crisp es susceptible o moderadamente susceptible a las enfermedades de campo más comunes. Es muy susceptible a la sarna común, roña y pudrición rosada. Los tubérculos de Ivory Crisp tienen un contenido de materia seca (22.4%) inferior al de Atlantic, pero más alto que el de Chipeta. El contenido de glicoalcaloide de los tubérculos de Ivory Crisp es muy bajo (4.3mg/100g⁻¹). Una solicitud para la protección de esta variedad ha sido registrada. Los productores de semilla de papa de Idaho, North Dakota y Canada tienen semilla disponible. Con propósitos de investigación se pueden obtener pequeñas cantidades de semilla contactándose con el autor respectivo.

INTRODUCTION

Ivory Crisp, released by the experiment stations of Idaho, Oregon, Washington, North Dakota, and the USDA Agricultural Research Service in 2002 originated from the cross ND292-1 x A77268-4 made at North Dakota State University in 1980 (pedigree is provided in Figure 1). ND292-1 is a North Dakota seedling with Sable (Davies and Young 1966), Norchip (Johansen et al. 1969), and Lenape (Akeley et al. 1968) in its pedigree. A77268-4 is a USDA/ARS (Aberdeen, Idaho) seedling with Lemhi Russet (Pavek et al. 1981) and Norchip in its pedigree. Ivory Crisp was introduced into Oregon from North Dakota in 1984 as a seedling tuber. It was first selected at Powell Butte, Oregon and went through 4 years of evaluation in the Oregon statewide trials. In 1988 to 1990 and 1994, Ivory Crisp was included in the Western Regional Chipping Trial. Prior to release, seed increases and commercial trials were conducted in Idaho.

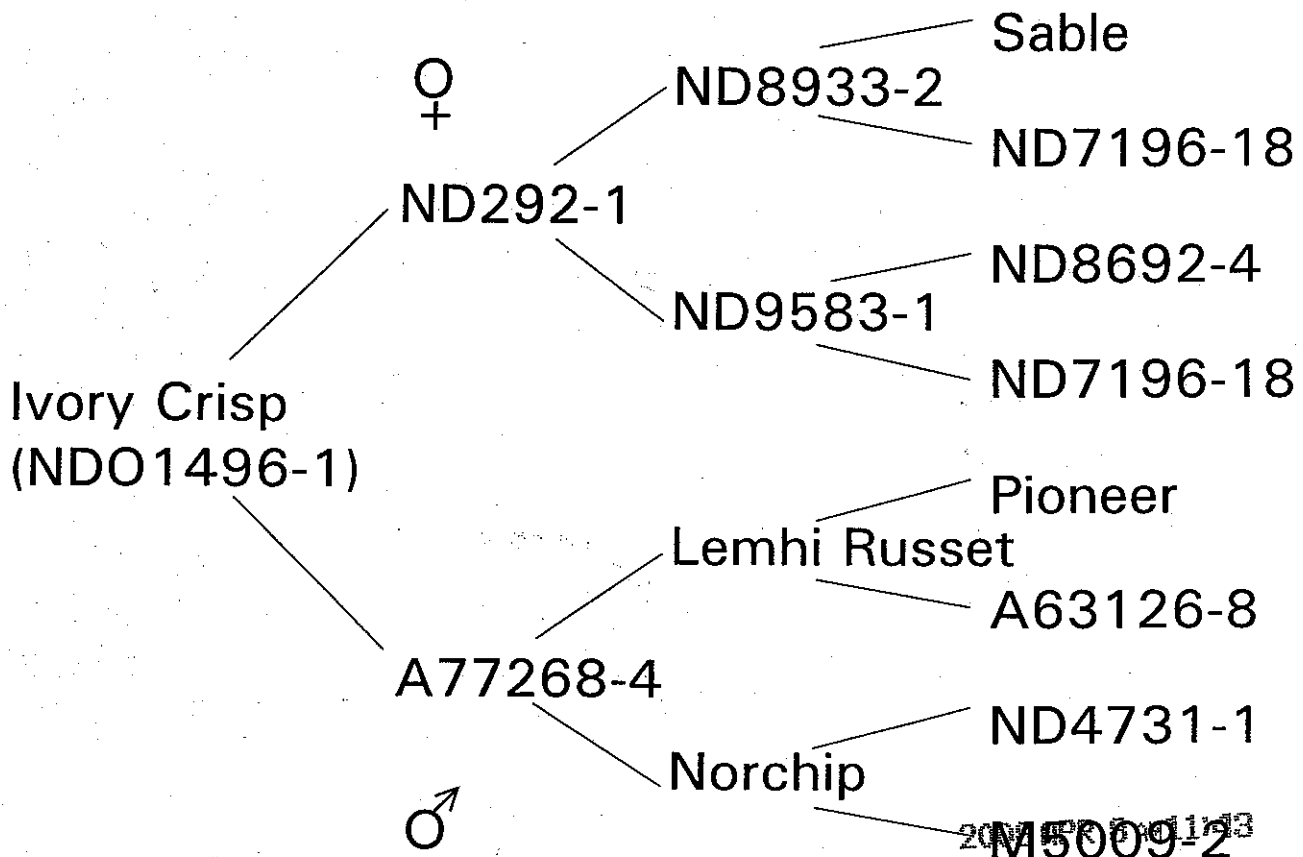


FIGURE 1. Four-generation pedigree of Ivory Crisp.

VARIETAL DESCRIPTION

Pictures of plants, inflorescence, tubers, and light sprouts of Ivory Crisp are presented in Figure 2.

Plant, Vine, and Foliage Descriptors

Growth habit: Medium-sized, spreading vine; medium maturity (111 to 120 days), similar to Atlantic and 10-20 days earlier than Chipeta. *Stems:* moderate number, generally small in diameter, anthocyanin pigmentation absent; stem nodes not swollen; prominent stem wings (≈ 3 mm wide) with wavy margins. *Leaves:* small to medium-sized; yellow-green (Royal Horticulture Society Color Chart [RHSCC] 146B); closed to moderately open silhouette; no anthocyanin pigmentation on the petioles and midribs. *Terminal leaflets:* broadly ovate shape with an acuminate tip and cordate base; slightly wavy margins; average length 100 mm, width 61 mm (100 leaves). *Primary leaflets:* 3 to 5 pairs with a mean of 4.1 pairs; medium ovate shape with an acuminate tip and cordate base. *Secondary leaflets:* 0 to 4 pairs, mean 2.5 pairs. *Tertiary leaflets:* 0 to 4 pairs, mean 0.7 pairs. *Stipules:* medium-sized, clasping.

Flower Descriptors

Inflorescence: Abundant, averaging 3.7 inflorescences per plant and 20.2 flowers per inflorescence. *Buds:* weak reddish-brown anthocyanin pigmentation on the buds but absent on the pedicels; moderate pubescence on the calyx and pedicel; pedicel articulation slightly prominent; buds seldom abort. *Calyx:* sepals awl-shaped, fused to one-half the length of the bud. *Corolla:* pentagonal to rotate shape; white (RHSCC 155A) on both inside and outside surfaces; medium large, mean width 38 mm. *Anthers:* Dark yellowish-orange color (RHSCC 17B); arranged in a narrow cone. *Stigma:* capitate, yellow-green color (RHSCC 146B). *Pollen:* Abundant, fertile. *Fruit:* moderate to heavy production in the field.

Tubers Descriptors

Tubers: Round to slightly oval shape; slightly compressed; mean length 76 mm, range 55 to 92 mm; mean width 79 mm, range 68 to 93 mm; mean thickness 63 mm, range 53 to 73 mm (measured tubers ranged between 168 and 336 g). *Skin:* white to buff (RHSCC 158B); not scaly. *Eyes:* apical eyes intermediate in depth, lateral eyes shallow; slightly prominent eyebrows; predominantly apical in distribution; moderate number, mean per tuber 13.3, range 9 to 26. *Flesh:* white to

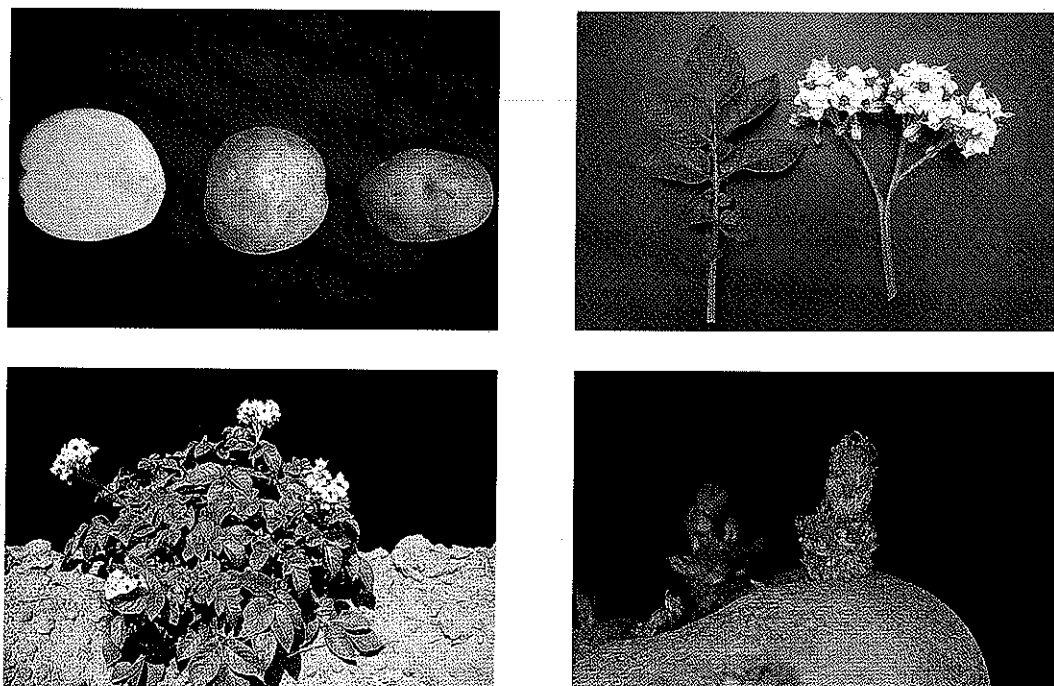


FIGURE 2. Pictures of Ivory Crisp tuber (A), plant (B), leaf and inflorescence (C), and light sprout (D).

slightly cream colored (RHSCC 158D); slightly prominent pith region. *Dormancy*: short to medium, similar to Atlantic. *Light sprout*: weak to moderate brownish-red anthocyanin pigmentation; spherical; slightly open bud scales; moderately

pubescent base with slightly hirsute bud scales; rapid rate of development.

TABLE 1—Total and U.S. No. 1 tuber yield and tuber specific gravity of Ivory Crisp and Atlantic potatoes grown in late-harvest trials in Idaho, Oregon, and Washington between 1988 and 1994.

Variety	Year	Tuber Yield			Specific Gravity ¹
		Total	U.S. No. 1	113-336g	
		- Mg ha ⁻¹ -	- Mg ha ⁻¹ -	- Mg ha ⁻¹ -	
Idaho²					
Ivory Crisp	1988	43.2	37.5	24.8	1.094
	1989	37.1	28.1	24.5	1.089
	1990	36.8	20.8	20.4	1.089
	1994	40.3	32.5	27.6	1.088
Atlantic	1988	47.4	39.1	20.5	1.085
	1989	34.5	23.5	20.9	1.090
	1990	42.3	35.6	34.0	1.096
	1994	42.0	34.3	23.1	1.092
Oregon³					
Ivory Crisp	1988	64.6	50.7	39.3	1.086
	1989	55.0	42.7	24.2	1.078
	1990	71.1	60.1	50.3	1.078
	1994	71.8	59.9	50.0	1.079
Atlantic	1988	62.0	53.9	38.9	1.089
	1989	72.1	59.1	39.2	1.079
	1990	79.0	67.4	47.6	1.084
	1994	67.4	59.4	38.1	1.082
Washington⁴					
Ivory Crisp	1988	60.0	53.4	45.5	1.091
	1989	75.5	60.3	33.2	1.081
	1994	37.1	23.5	22.8	1.087
Atlantic	1988	56.0	42.6	28.1	1.087
	1989	81.4	70.3	41.7	1.087
	1994	24.3	17.7	10.3	1.090
Overall Mean					
Ivory Crisp		53.9	42.7	33.0	1.085
Atlantic		55.3	45.7	31.1	1.088

¹Tuber specific gravity determined using the weight-in-air/weight-in-water method.

²Trials conducted by Dr. Stephen Love, University of Idaho, at Aberdeen, Idaho.

³Trials conducted by Dr. Dan Hane, Oregon State University, at Hermiston, Oregon.

⁴Trials conducted by Dr. Robert Thornton, Washington State University, at Othello, Washington.

Agronomic Performance

Ivory Crisp was evaluated for 4 years in Western Regional chipping trials. Overall, total yield of Ivory Crisp was 3% lower than that of Atlantic, U.S. No. 1 yield was 7% lower, and yield of tubers weighing 113 to 336 g (comparable to 1 7/8 to 3 1/2 in diameter) was 6% higher (Table 1). In the Idaho and Oregon trials, Atlantic produced higher mean yields than Ivory Crisp, while in Washington, the opposite was true. The yield advantage in Washington was, in part, due to a poor performance by Atlantic in 1994.

In early harvest trials grown at Hermiston, Oregon, Ivory Crisp produced slightly lower total and U.S. No. 1 yields, and also a lower yield of 113 to 336 g tubers, in comparison with Atlantic (Table 2). The average number of days from planting to harvest in the early trials was 116 days.

In late harvest trials at Aberdeen and Rexburg, Idaho, on average Ivory Crisp produced higher tuber yields than Atlantic, but lower yields than Chipeta (Table 3). Compared with Chipeta, Ivory Crisp was 19% lower for total yield, 29% lower for U.S. No. 1 yield, but slightly higher for yield of tubers between 113 and 336 g.

TABLE 2—Total and U.S. No. 1 tuber yield and tuber specific gravity of Ivory Crisp and Atlantic potatoes grown in early-harvest trials at Hermiston, Oregon.¹

Variety	Year	Tuber Yield			Specific Gravity ²
		Total	U.S. No. 1	113-336g	
		- Mg ha ⁻¹ -	- Mg ha ⁻¹ -	- Mg ha ⁻¹ -	
Annual Means					
Ivory Crisp	1988	53.2	36.6	34.4	1.091
	1989	52.0	29.2	26.3	1.081
	1994	57.0	43.0	42.4	1.092
Atlantic	1988	50.6	35.0	32.3	1.088
	1989	55.3	36.2	33.0	1.083
	1994	58.6	44.4	40.8	1.096
Overall Means					
Ivory Crisp		54.1	36.3	34.4	1.088
Atlantic		54.9	38.5	35.4	1.089

¹Trials conducted by Dr. Dan Hane, Oregon State University, at Hermiston, Oregon.

²Tuber specific gravity determined using the weight-in-air/weight-in-water method.

TABLE 3—Total and U.S. No. 1 tuber yield and tuber specific gravity of Ivory Crisp, Atlantic, and Chipeta potatoes grown in late-harvest trials at Aberdeen and Rexburg, Idaho.

Variety	Year/Loc ¹	Tuber Yield			Specific Gravity ²	Hollow Heart ³	Chip Color ⁴	
		Total	U.S. No. 1	113-336g			4.4 C	10.0 C
		- Mg ha ⁻¹ -	- Mg ha ⁻¹ -	- Mg ha ⁻¹ -		- % -		
Trial Means								
Ivory Crisp	1988A	43.2	37.6	24.6	1.094	2	1.3	1.0
	1989A	37.1	28.2	24.5	1.089	0	2.6	1.0
	1991R	38.5	30.8	23.9	1.095	0	2.4	1.0
	1992A	50.2	42.1	36.1	1.095	0	4.0	1.0
	1992A	49.3	36.5	34.0	1.094	0	3.3	1.0
	1992R	49.1	36.3	30.4	1.092	3	3.0	1.0
	1993A	36.6	30.4	27.5	1.102	0	2.2	1.0
	1993R	36.4	27.7	24.4	1.089	2	2.5	1.0
	1994A	40.3	32.7	27.8	1.088	0	2.1	1.1
	1995A	47.4	33.6	31.3	1.092	0	1.8	1.0
1996A	47.0	42.3	33.4	1.095	0	3.4	1.0	
Atlantic	1988A	47.4	39.3	20.8	1.095	40	1.8	1.5
	1989A	34.5	23.5	21.0	1.090	0	3.1	1.6
	1991R	35.4	28.0	20.9	1.095	15	2.4	1.1
	1992A	45.8	41.7	36.6	1.097	0	4.2	2.2
	1992A	47.3	43.0	34.0	1.097	0	4.0	2.1
	1992R	54.3	41.3	32.0	1.099	13	3.0	1.0
	1993A	22.1	18.1	16.5	1.101	13	3.6	2.0
	1993R	32.4	20.4	15.2	1.093	17	3.3	1.6
	1994A	42.0	34.4	23.1	1.092	43	2.8	1.8
	1995A	43.9	33.4	29.0	1.097	25	2.7	2.2
1996A	40.9	34.3	32.7	1.097	0	3.5	1.2	
Chipeta	1988A	50.3	43.2	26.7	1.094	2	1.8	1.4
	1989A	50.8	45.8	34.6	1.087	3	3.0	1.1
	1991R	43.8	30.7	19.3	1.089	3	3.1	1.4
	1992A	58.4	55.4	34.4	1.084	3	4.0	1.9
	1992A	59.7	56.1	33.4	1.085	3	4.0	2.0
	1992R	49.4	40.0	33.1	1.088	0	3.4	1.0
	1993A	44.5	40.9	32.0	1.095	3	3.1	1.5
	1993R	46.4	33.5	23.2	1.090	3	3.3	1.3
	1994A	61.8	50.7	21.0	1.083	3	3.2	1.4
	1995A	51.4	44.2	26.2	1.086	13	3.1	2.1
1996A	46.8	44.5	27.6	1.088	0	3.9	1.0	
Overall Means								
Ivory Crisp		43.2	34.4	23.9	1.093	1	2.6	1.0
Atlantic		40.5	32.5	25.6	1.096	15	3.0	1.7
Chipeta		51.2	44.1	28.3	1.088	3	3.3	1.5

¹Locations: A = Aberdeen, Idaho, experiment station site; R = Rexburg, Idaho, grower field. In 1992, there were two separate trials at Aberdeen.

²Tuber specific gravity determined using the weight-in-air/weight-in-water method.

³Hollow heart and/or brown center evaluated in tubers over 336 g.

⁴Cooked and rated after 3 months storage at 4.4 C and 10.0 C using the Snack Food Association color chart, where 1 = very light color, and 5 = very dark color. Acceptable chips are rated 2 or below.

Quality Characteristics

Average tuber specific gravity of Ivory Crisp tubers grown in Idaho, Oregon, and Washington was 1.080 or above, but slightly lower than the average for Atlantic tubers (Table 1). The same comparison trend was expressed in the early harvest Oregon trials (Table 2) and in the eastern Idaho late trials (Table 3). Tuber specific gravity for Ivory Crisp in all trials was consistently in the range considered acceptable for potato chip production. The lowest single trial measurements were in 1989 and 1990 in Oregon (Table 1) where the specific gravity was 1.078.

Ivory Crisp has shown good resistance to most internal and external defect problems. It is markedly more resistant to hollow heart and internal brown spot than Atlantic, and slightly less resistant to shatter bruise and growth cracks (Table 4). Although the average shatter bruise score for Ivory Crisp would indicate a tendency for resistance, in some trials, when conditions were conducive to injury, shatter bruise on Ivory Crisp was very severe. In observations at Aberdeen, Idaho, Ivory Crisp seldom or never developed defects associated with stem-end discoloration or second growth. It is also resistant to blackspot bruise, as established using both abrasive peel tests and post-handling assessments.

Excellent chip color following storage is a desirable characteristic of Ivory Crisp (Tables 3 and 4). It produces chips with lighter color than either Atlantic or Chipeta after storage at 4.4 or 10.0 C. The average chip score for Ivory Crisp following storage at 4.4 C approached the acceptable level,

while those of Atlantic and Chipeta were clearly unacceptable. Ivory Crisp has also demonstrated a strong ability to recondition following the development of color problems (data not shown). The cold-sweetening response of Ivory Crisp follow-

ing storage has been similar to that of Snowden, NorValley, and Dakota Pearl, varieties that are considered to be modern cold-sweetening resistant varieties (Sowokinos and Glynn 2002).

TABLE 4—Internal and external tuber characteristics and chip color of Ivory Crisp and Atlantic grown in late-harvest trials in Idaho, Oregon, and Washington.¹

Cultivar	Growth Cracks ²	Shatter Bruise ³	Hollow Heart ⁴	Internal Brown Spot ⁵	Chip Color ⁶		
					4.4 C	7.3 C	10.0 C
			-%	-%			
Ivory Crisp	4.3	3.6	3	0	1.1	1.2	2.3
Atlantic	4.6	3.8	19	5	1.5	1.4	3.1

¹Includes trials at Aberdeen, Idaho (4 years), Hermiston, Oregon (4 years), and at Othello, Washington (3 years).

²Growth cracks rated 1-5 with 1 = severe, 5 = none.

³Shatter bruise rated 1-5 with 1 = severe, 5 = none.

⁴Incidence of hollow heart reported as a percentage of tubers over 336 g with visible hollow heart and/or brown center symptoms.

⁵Incidence of internal brown spot (heat necrosis) reported as a percentage of tubers over 336 g with symptoms.

⁶Chip color rated using the Snack Food Association color chart, where 1 = very light color, 5 = very dark color. Acceptable chips are rate 2 or below. Chips were cooked and rated after 3 months storage at 4.4 C and 10.0 C at Aberdeen, Idaho, and at 7.3 C at Hermiston, Oregon.

TABLE 5—Disease reactions of Ivory Crisp, Atlantic, and Chipeta.¹

Cultivar	Common Scab	Vert. Wilt	Foliar Early Blight	PVX	PVY	PLRV	Net Necrosis
Ivory Crisp	5	5	7	7	7	7	2
Atlantic	3	4	7	1	7	7	2
Chipeta	2	2	5	7	7	7	2

¹Disease response rated 1-9 where 1 = very resistant and 9 = very susceptible. Values were based on controlled field screening studies. Ratings are a composite of 1-3 years of screening trials conducted at Aberdeen (common scab, vert. wilt, and foliar early blight, and Kimberly, Idaho (PVX, PVY, PLRV, and net necrosis).

TABLE 6—Biochemical analyses of Ivory Crisp, Atlantic, and Chipeta tubers.¹

Cultivar	Dry Matter	Sucrose ²	Dextrose ²	Protein ²	Vitamin C ²	Total Glycoalkaloids ²
	-%	-%	-%	-%	- mg 100 g ⁻¹	- mg 100 g ⁻¹
Ivory Crisp	23.2	0.18	0.02	6.9	17.6	3.9
Atlantic	24.0	0.18	0.06	6.1	17.6	7.4
Chipeta	22.7	0.19	0.06	6.3	20.4	4.4

¹Data derived from tubers grown at Aberdeen, Idaho, in 1989, 1992 and 1994-95. Tubers were stored for 1 month at 7.3-12.7 C prior to sample preparation. All samples were cubed, freeze-dried, and ground prior to analyses.

²Sucrose, dextrose, vitamin C and glycoalkaloids determined on the fresh weight basis, protein determined on a dry weight basis.

Disease Reactions

Ivory Crisp is susceptible to most common field diseases of potato, including common scab, foliar early blight, Verticillium wilt, PVX, PVY, and PLRV (Table 5). It was very susceptible to both the foliar and tuber phases of late blight when tested at Mt. Vernon, Washington, and Corvallis, Oregon. Recent field tests have also shown Ivory Crisp to be very susceptible to pink rot and powdery scab. Ivory Crisp is resistant to tuber net necrosis induced by PLRV. It has shown typical symptoms following infection with bacterial ringrot and strong symptoms, without a latent tendency, when infected with PVY. Ivory Crisp is susceptible to common potato storage rots but has not shown unusual problems in storage.

Biochemical and Nutritional Characteristics

In analyses conducted as part of the Western Regional Trials, tubers of Ivory Crisp were intermediate in dry matter between Atlantic and Chipeta (Table 6). The sucrose content of Ivory Crisp tubers was similar to that of Atlantic and Chipeta, while dextrose was lower, and protein higher. Tubers of Ivory Crisp were lower in vitamin C than those of Chipeta. Tubers of Ivory Crisp were consistently lower in total glycoalkaloids than either Atlantic or Chipeta.

Usage

Ivory Crisp was bred for and is suited to the manufacture of potato chips. It can be marketed directly from the field as an early or late-harvested crop, or following storage. Although intended for chipping, Ivory Crisp can be used as a tablestock potato and produces acceptable boiled and mashed products with little sloughing during cooking.

Management

Based on disease reactions and studies on management of Ivory Crisp conducted primarily in southeastern Idaho, the following management practices are recommended. Soils infested with root-knot or stubby root nematodes, or with a history of early dying, should be fumigated. Only certified seed should be planted to minimize yield-reducing virus problems. Seed should be cut within the size range of 40 to 70 g (1.5 to 2.5 oz) and treated with a fungicidal seedpiece treatment.

Ivory Crisp requires a relatively large amount of nitrogen fertilizer to maximize yields. The optimum application rate in southeastern Idaho has been 258 to 303 kg N/ha (230 to 270 lbs N/acre) for a full-season crop. About 80% of the total nitrogen fertilizer should be applied by the time the first flush of flowers is gone. Petiole nitrate nitrogen content should be at 17,000 to 20,000 ppm prior to tuber set, 13,000 to 18,000 ppm during tuber set and early bulking, and allowed to fall to 7,000 to 9,000 ppm by the onset of senescence. Nitrogen fertilizer applications on potatoes destined for early harvest should be reduced by as much as 25% from the rates recommended for full-season production.

Under threat of infection with late blight, an effective fungicide program should be followed. In late-blight infected fields, tubers of Ivory Crisp should be inspected for tuber rot before going into long-term storage. Ivory Crisp has relatively short dormancy (similar to Atlantic), and sprout inhibitors should be applied within two months after harvest to maintain minimal sprouting. If sugars accumulate above optimal levels, Ivory Crisp tubers can be effectively reconditioned by raising the storage temperature to between 12 and 15 C for 2 to 3 wk.

Availability

An application for Plant Variety Protection has been filed for Ivory Crisp. Seed is available from potato seed growers in Idaho, North Dakota, and Canada. Small amounts of seed, for research purposes, can be obtained by contacting the corresponding author, Dr. Stephen Love.

ACKNOWLEDGMENTS

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OBJECTIVE DESCRIPTION OF VARIETY
POTATO (*Solanum tuberosum* L.)

INSTRUCTIONS

#200200157

The Objective Description Form:

The objective description form lists characteristics to be used as the basis for developing the description of potato varieties. It is designed to guide the applicant in describing a variety in detail so a meaningful comparison with other potato varieties can be accomplished. It is recommended that this form be completed in as much detail as possible to ensure an accurate description. Please fill in the requested data and place the appropriate number that describes the varietal characters typical of this potato variety and the reference varieties in the respective boxes.

Test Guidelines:

Any statistical and trial (field test) data that may be necessary to support the variety description should be attached to this form. Please include for trial data the plot size, number of replications, number of plants, plant spacing, trial locations and growing periods. Trials should normally be conducted at one place, in the region that the variety has been adapted for, with a minimum of one growing period in the U.S.A. All comparative data should be determined from varieties entered in the same trials. The size of the plots should be such that plants or plant parts of plants may be removed for measuring and counting without prejudice to the observations which must be made at the end of the growing period. As a minimum, each test should include a total of 60 plants which should be divided between two or more replicates. Separate plots for observation and measuring can only be used if they have been subject to similar environmental conditions. To determine color for a plant or plant parts a recognized standard color chart must be used such as the Royal Horticultural Society (R.H.S.) Color Chart.

Reference Varieties:

The application variety should be compared to a set of reference varieties. The reference varieties should be market class standard varieties currently grown in the United States and the varieties most similar. The following varieties are recommended as market class standards to be used as reference varieties:

Yellow-flesh tablestock.....	Yukon Gold
Round-white tablestock.....	Superior
Chip-processing.....	Atlantic, Snowden, Norchip
Frozen-processing.....	Russet Burbank
Russet tablestock.....	Russet Burbank, Russet Norkotah, Goldrush
Red tablestock.....	Red Pontiac, Red Norland, Red Lasoda

Characteristics:

The plant type and growth habit characteristics are collected at early first bloom. Figure 1 is supplied to help visualize the growth habit. For this descriptor, look at the stems rather than the stems and foliage. Plant maturity is measured at natural vine senescence.

Stem characteristics are also collected at early bloom. Stem anthocyanin coloration is divided into two descriptors: Location and intensity. Figure 12 is supplied to give an example of stem wings.

Leaf characteristics are observed at early first bloom. Fully-developed leaves located on the middle third of the plant should be used. Leaf pubescence refers to general trichomes. Figure 2 is supplied for examples of leaf silhouette. Figure 3 should be used to describe terminal and primary leaflet shape. Figures 4 and 5 are used to describe the terminal and primary leaflet shape of tip and base, respectively. To measure the total number of primary leaflets pairs, collect 10 fully-developed petioles (with leaves attached from each replication and take the average number of secondary and tertiary leaflets. Figure 11 is supplied to define leaf characteristics. Glandular trichomes should be described through descriptor #12 (Additional Comments and Characteristics). Leaf stipules are shown in figure 13 for visual definition.

Inflorescence characteristics should be measured at early first bloom. Figures 6 and 7 are supplied to describe corolla and anther shape, respectively. Corolla, calyx, anther, stigma and pollen should be observed on newly opened flowers. Berry production should be based on field-grown plants rather than greenhouse plants.

Tuber characteristics should be observed following harvest. Figures 9 and 10 are available to describe distribution of secondary color and tuber shape, respectively.

OBJECTIVE DESCRIPTION OF VARIETY

Exhibit C (Potato) Page 2

Disease and pest reactions should be based upon specific tests rather than field observations. Other diseases or pests reactions not requested can be described if it is felt that it would be helpful to the description.

Quality characteristics should be described according to the market use.

If the plant is transgenic, this gene insertion(s) should be described.

Chemical identification and any other characteristics can be describe if they are helpful in distinguishing the variety.

A rating system of 1-9 provides a scale for describing most characteristics in this form. Characteristic may be rated with intermediate values where the characteristic grades gradually from one extreme to another. For example where the states for a characteristic are described as: 3 = Small; 5 = Medium; 7 = Large; the other values of 1, 2, 4, 6, 8, or 9 may be selected.

Legend:

V = Application Variety

R1-R4 = Reference Varieties

#200200157

OBJECTIVE DESCRIPTION OF VARIETY
 POTATO (*Solanum tuberosum* L.)

NAME OF APPLICANT(S) University of Idaho	FOR OFFICIAL USE ONLY
	PVPO NUMBER #200200157
ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) Idaho Agricultural Experiment Station University of Idaho Moscow, ID 83843	VARIETY (V) NAME Ivory Crisp
	TEMPORARY OR EXPERIMENTAL DESIGNATION ND01496-1

REFERENCE VARIETIES: Enter the reference variety name in the appropriate box

Reference Variety 1 (R1)	Reference Variety 2 (R2)	Reference Variety 3 (R3)	Reference Variety 4 (R4)
Atlantic			

1. MARKET CHARACTERISTICS:

MARKET CLASS:

1 = Yellow-flesh tablestock; 2 = Round-white tablestock; 3 = Chip-processing; 4 = Frozen-processing;
 5 = Russet tablestock; 6 = Other _____

V	3	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

2. PLANT CHARACTERISTICS:

GROWTH HABIT: (See figure 1)
 3 = Erect (>45° with ground); 5 = Semi-erect (30-45° with ground); 7 = Spreading.

V	7	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

per correspondence 04-02-08 LMC 04-21-08

TYPE:

1 = Stem (foliage open, stems clearly visible); 2 = Intermediate; 3 = Leaf (Foliage closed, stems hardly visible)

V	2	R1	2	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

MATURITY: Days after planting (DAP) at vine senescence

V	115	R1	115	R2		R3		R4	
---	-----	----	-----	----	--	----	--	----	--

PLANTING DATE:

V	Apr 28 97, 98	R1	Apr 28 97, 98	R2		R3		R4	
---	---------------	----	---------------	----	--	----	--	----	--

REGION/AREA:

V	Aberdeen, ID	R1	Aberdeen, ID	R2		R3		R4	
---	--------------	----	--------------	----	--	----	--	----	--

OBJECTIVE DESCRIPTION OF VARIETY

MATURITY CLASS:

1 = Very Early (<100 DAP); 2 = Early (100-110 DAP); 3 = Mid-season (111-120 DAP); 4 = Late (121-130 DAP); 5 = Very Late (>130 DAP).

#200200157

V	3	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

3. STEM CHARACTERISTICS: *Measure at early first bloom*

STEM ANTHOCYANIN COLORATION:

1 = Absent; 3 = Weak; 5 = Medium; 7 = Strong; 9 = Very Strong

V	2/3	R1	1	R2		R3		R4	
---	-----	----	---	----	--	----	--	----	--

per correspondance 04-02-08 LMC 4-21-08

STEM WINGS: *(See figure 12)*

1 = Absent; 3 = Weak; 5 = Medium; 7 = Strong; 9 = Very Strong

V	5	R1	7	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

4. LEAF CHARACTERISTICS:

LEAF COLOR: *Observe fully developed leaves located on middle 1/3 of plant*

1 = Yellowish-green; 2 = Olive-green; 3 = Medium green; 4 = Dark green; 5 = Grey-green; 6 = Other

V	1	R1	1	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

LEAF COLOR: *Observe fully developed leaves located on middle 1/3 of plant and circle the appropriate color chart*
Royal Horticulture Society Color Chart value or Munsell Color Chart value

V	Y-G 146B	R1	Y-G 146A	R2		R3		R4	
---	-------------	----	-------------	----	--	----	--	----	--

LEAF PUBESCENCE DENSITY:

1 = Absent; 2 = Sparse; 3 = Medium; 4 = Thick; 5 = Heavy

V	2	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

LEAF PUBESCENCE LENGTH:

1 = None; 2 = Short; 3 = Medium; 4 = Long; 5 = Very long

V	2	R1	2	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

(Note: Descriptor #19 can be used to describe the type and length of the glandular trichomes observed.)

LEAF SILHOUETTE: *(See figure 2)*

1 = Closed; 3 = Medium; 5 = Open

V	1	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

OBJECTIVE DESCRIPTION OF VARIETY

#200200157

PETIOLES ANTHOCYANIN COLORATION:

1 = Absent; 3 = Weak; 5 = Medium; 7 = Strong; 9 = Very Strong

V	1	R1	1	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

LEAF STIPULES SIZE: (See figure 13)

1 = Absent; 3 = Small; 5 = Medium; 7 = Large

V	3	R1	7	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

per correspondance 04-02-08
LMC 04-21-08

TERMINAL LEAFLET SHAPE: (See figure 3 & 11)

1 = Narrowly ovate; 2 = Medium ovate; 3 = Broadly ovate; 4 = Lanceolate; 5 = Elliptical;
6 = Obovate; 7 = Oblong; 8 = Other _____

V	3	R1	2	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

TERMINAL LEAFLET TIP SHAPE: (See figure 4 & 11)

1 = Acute; 2 = Cuspidate; 3 = Acuminate; 4 = Obtuse; 5 = Other _____

V	2	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

TERMINAL LEAFLET BASE SHAPE: (See figure 5 & 11)

1 = Cuneate; 2 = Acute; 3 = Obtuse; 4 = Cordate; 5 = Truncate; 6 = Lobed; 7 = Other _____

V	4	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

TERMINAL LEAFLET MARGIN WAVINESS:

1 = Absent; 2 = Slight; 3 = Weak; 4 = Medium; 5 = Strong

V	2	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

NUMBER OF PRIMARY LEAFLET PAIRS: (See figure 11)

AVERAGE:

V	4.1	R1	4.1	R2		R3		R4	
---	-----	----	-----	----	--	----	--	----	--

RANGE:

V	3 to 5	R1	3 to 5	R2	to	R3	to	R4	to
---	--------	----	--------	----	----	----	----	----	----

PRIMARY LEAFLET TIP SHAPE: (See figure 4 & 11)

1 = Acute; 2 = Cuspidate; 3 = Acuminate; 4 = Obtuse; 5 = Other _____

V	3	R1	3	R2		R3		R4	41
---	---	----	---	----	--	----	--	----	----

OBJECTIVE DESCRIPTION OF VARIETY

#200200157

PRIMARY LEAFLET SHAPE: (See figure 3 & 11)

1 = Narrowly ovate; 2 = Medium ovate; 3 = Broadly ovate; 4 = Lanceolate; 5 = Elliptical; 6 = Obovate; 7 = Oblong; 8 = Other _____

V	2	R1	1	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

PRIMARY LEAFLET BASE SHAPE: (See figure 5 & 11)

1 = Cuneate; 2 = Acute; 3 = Obtuse; 4 = Cordate; 5 = Truncate; 6 = Lobed; 7 = Other _____

V	4	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

NUMBER OF SECONDARY AND TERTIARY LEAFLET PAIRS: (See figure 11)

AVERAGE:

V	3.3	R1	5.9	R2		R3		R4	
---	-----	----	-----	----	--	----	--	----	--

RANGE:

V	0 to 7	R1	2 to 12	R2	to	R3	to	R4	to
---	--------	----	---------	----	----	----	----	----	----

5. INFLORESCENCE CHARACTERISTICS:

NUMBER OF INFLORESCENCE / PLANT:

AVERAGE:

V	3.7	R1	12.3	R2		R3		R4	
---	-----	----	------	----	--	----	--	----	--

RANGE:

V	1 to 7	R1	1 to 4	R2	to	R3	to	R4	to
---	--------	----	--------	----	----	----	----	----	----

NUMBER OF FLORETS / INFLORESCENCE:

AVERAGE:

V	20.2	R1	13.4	R2		R3		R4	
---	------	----	------	----	--	----	--	----	--

RANGE:

V	8 to 36	R1	9 to 23	R2	to	R3	to	R4	to
---	---------	----	---------	----	----	----	----	----	----

COROLLA INNER SURFACE COLOR: Measure predominant color of newly open flower and circle the appropriate color chart Royal Horticulture Society Color Chart value or Munsell Color Chart value

V	Wh 155A	R1	Pur 76D	R2		R3		R4	
---	------------	----	------------	----	--	----	--	----	--

COROLLA OUTER SURFACE COLOR: Circle the appropriate color chart Royal Horticulture Society Color Chart value or Munsell Color Chart value

V	Wh 155A	R1	Pur 76D	R2		R3		R4	
---	------------	----	------------	----	--	----	--	----	--

OBJECTIVE DESCRIPTION OF VARIETY

Exhibit C (Potato) Page 7

#200200157

COROLLA SHAPE: (See figure 6)

1 = Very rotate; 2 = Rotate; 3 = Pentagonal; 4 = Semi-stellate; 5 = Stellate

V	3
---	---

R1	3
----	---

R2	
----	--

R3	
----	--

R4	
----	--

CALYX ANTHOCYANIN COLORATION:

1 = Absent; 3 = Weak; 5 = Medium; 7 = Strong; 9 = Very strong

V	1
---	---

R1	23
----	----

per correspondance 04-02-08

R2	
----	--

R3	
----	--

LMC 04-21-08

R4	
----	--

ANTHER COLOR: Measure when newly opened flower is fully expanded and circle the appropriate color chart

Royal Horticulture Society Color Chart value or Munsell Color Chart value

V	Y-O 17B
---	------------

R1	Y 12A
----	----------

R2	
----	--

R3	
----	--

R4	
----	--

ANTHER SHAPE: (See figure 7)

1 = Broad cone; 2 = Narrow cone; 3 = Pear shape cone; 4 = Loose; 5 = Other

V	2
---	---

R1	2
----	---

R2	
----	--

R3	
----	--

R4	
----	--

POLLEN PRODUCTION:

1 = None; 3 = Some; 5 = Abundant

V	5
---	---

R1	5
----	---

R2	
----	--

R3	
----	--

R4	
----	--

STIGMA SHAPE: (See figure 8)

1 = Capitate; 2 = Clavate; 3 = Bi-lobed

V	1
---	---

R1	1
----	---

R2	
----	--

R3	
----	--

R4	
----	--

STIGMA COLOR: Circle the appropriate color chart

Royal Horticulture Society Color Chart value or Munsell Color Chart value

V	Y-G 146B
---	-------------

R1	Y-G 146A
----	-------------

R2	
----	--

R3	
----	--

R4	
----	--

BERRY PRODUCTION: Under field conditions

1 = None; 3 = Low; 5 = Moderate; 7 = Heavy; 9 = Very heavy

V	5
---	---

R1	5
----	---

R2	
----	--

R3	
----	--

R4	
----	--

OBJECTIVE DESCRIPTION OF VARIETY

5. TUBER CHARACTERISTICS:

#200200157

PREDOMINANT SKIN COLOR:

1 = White; 2 = Light Yellow; 3 = Yellow; 4 = Buff; 5 = Tan; 6 = Brown; 7 = Pink; 8 = Red; 9 = Purplish-red; 10 = Purple; 11 = Dark purple-black; 12 = Other _____

V	1	R1	4	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

GIVE COLOR CHART VALUE AND CIRCLE THE APPROPRIATE COLOR CHART

Royal Horticulture Society Color Chart value or Munsell Color Chart value

V	Y-W 158B	R1	G-Y 167B		R2		R3		R4	
---	-------------	----	-------------	--	----	--	----	--	----	--

SECONDARY SKIN COLOR:

1 = Absent; 2 = Present, please describe _____

V	1	R1	1	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

IF PRESENT, GIVE COLOR CHART VALUE AND CIRCLE THE APPROPRIATE COLOR CHART

Royal Horticulture Society Color Chart value or Munsell Color Chart value

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

SECONDARY SKIN COLOR DISTRIBUTION: *If present*

1 = Eyes; 2 = Eyebrows; 3 = Splashed; 4 = Scattered; 5 = Spectacled; 6 = Stippled; 7 = Other _____

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

SKIN TEXTURE:

1 = Smooth; 2 = Rough (flaky); 3 = Netted; 4 = Russetted; 5 = Heavily russetted; 6 = Other _____

V	1	R1	2	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

TUBER SHAPE: (See figure 10)

1 = Compressed; 2 = Round; 3 = Oval; 4 = Oblong; 5 = Long; 6 = Other _____

V	2	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

TUBE THICKNESS:

1 = Round; 2 = Medium thick; 3 = Slightly flattened; 4 = Flattened; 5 = Other _____

V	2	R1	2	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

OBJECTIVE DESCRIPTION OF VARIETY

#200200157

TUBER LENGTH (mm):

AVERAGE:

V	77	R1	81	R2		R3		R4	
---	----	----	----	----	--	----	--	----	--

RANGE:

V	55 to 100	R1	50 to 102	R2	to	R3	to	R4	to
---	-----------	----	-----------	----	----	----	----	----	----

STANDARD DEVIATION:

V	0.69	R1	0.77	R2		R3		R4	
---	------	----	------	----	--	----	--	----	--

AVERAGE WEIGHT OF SAMPLE TAKEN:

V	225g	R1	225g	R2		R3		R4	
---	------	----	------	----	--	----	--	----	--

TUBER WIDTH (mm):

AVERAGE:

V	78	R1	76	R2		R3		R4	
---	----	----	----	----	--	----	--	----	--

RANGE:

V	68 to 93	R1	65 to 92	R2	to	R3	to	R4	to
---	----------	----	----------	----	----	----	----	----	----

STANDARD DEVIATION:

V	0.47	R1	0.53	R2		R3		R4	
---	------	----	------	----	--	----	--	----	--

AVERAGE WEIGHT OF SAMPLE TAKEN:

V	225g	R1	225g	R2		R3		R4	
---	------	----	------	----	--	----	--	----	--

TUBER THICKNESS (mm):

AVERAGE:

V	63	R1	63	R2		R3		R4	
---	----	----	----	----	--	----	--	----	--

RANGE:

V	51 to 84	R1	50 to 85	R2	to	R3	to	R4	to
---	----------	----	----------	----	----	----	----	----	----

STANDARD DEVIATION:

V	0.46	R1	0.53	R2		R3		R4	
---	------	----	------	----	--	----	--	----	--

AVERAGE WEIGHT OF SAMPLE TAKEN:

V	225g	R1	225g	R2		R3		R4	
---	------	----	------	----	--	----	--	----	--

TUBER EYE DEPTH:

1 = Protruding; 2 = Shallow; 3 = Intermediate; 4 = Deep; 5 = Very deep

V	3	R1	4	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

OBJECTIVE DESCRIPTION OF VARIETY

TUBER LATERAL EYES:

1 = Protruding; 2 = Shallow; 3 = Intermediate; 4 = Deep; 5 = Very deep

#200200157

V	2	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

NUMBER EYE / TUBER:

AVERAGE:

V	13.3	R1	9.7	R2		R3		R4	
---	------	----	-----	----	--	----	--	----	--

RANGE:

V	9 to 26	R1	5 to 14	R2	to	R3	to	R4	to
---	---------	----	---------	----	----	----	----	----	----

DISTRIBUTION OF TUBER EYES:

1 = Predominantly apical; 2 = Evenly distributed

V	1	R1	1	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

PROMINENCE OF TUBER EYEBROWS:

1 = Not prominent; 2 = Slight prominence; 3 = Medium prominence; 4 = Very prominence; 5 = Other

V	2	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

PRIMARY TUBER FLESH COLOR: *Circle the appropriate color chart*

Royal Horticulture Society Color Chart value or Munsell Color Chart value

V	W 158D	R1	W 158D	R2		R3		R4	
---	-----------	----	-----------	----	--	----	--	----	--

SECONDARY TUBER FLESH COLOR:

1 = Absent; 2 = Present, please describe

V	1	R1	1	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

IF PRESENT, CIRCLE THE APPROPRIATE COLOR CHART:

Royal Horticulture Society Color Chart value or Munsell Color Chart value

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

NUMBER OF TUBER / PLANT:

1 = Low (<8); 2 = Medium (8-15); 3 = High (>15)

V	1	R1	1	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

OBJECTIVE DESCRIPTION OF VARIETY

6. DISEASES CHARACTERISTICS:

#200200157

DISEASES REACTION: 0 = NOT TESTED; 1 = RESISTANT; 3 = MODERATELY RESISTANT;
5 = MODERATELY SUSCEPTIBLE; 7 = SUSCEPTIBLE; 9 = HIGHLY SUSCEPTIBLE

BACTERIAL RING ROT: Foliar reaction

V	0	R1	0	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

BACTERIAL RING ROT: Tuber reaction

V	6	R1	5	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

LATE BLIGHT

V	8	R1	8	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

PLRV (leaf roll)

V	7	R1	7	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

PVX

V	7	R1	1	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

PVY

V	7	R1	7	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

OTHER: Common Scab

V	7	R1	5	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

OTHER: Verticillium Wilt

V	5	R1	4	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

7. PESTS CHARACTERISTICS:

PEST REACTION: 0 = NOT TESTED; 1 = RESISTANT; 3 = MODERATELY RESISTANT;
5 = MODERATELY SUSCEPTIBLE; 7 = SUSCEPTIBLE; 9 = HIGHLY SUSCEPTIBLE

GOLDEN NEMATODE

V	7	R1	1	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

OTHER: Root Knot Nematode

V	7	R1	7	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

8. GENE TRAITS:

INSERTION OF GENES:

YES

NO

If YES, describe the gene(s) introduced or attach information:

OBJECTIVE DESCRIPTION OF VARIETY

9. QUALITY CHARACTERISTICS:

CHIEF MARKET:

Chip processing

#200200157

SPECIFIC GRAVITY (wt. air / wt. air - wt. water)

1 < 1.060; 2 = 1.060-1.069; 3 = 1.070-1.079; 4 = 1.080-1.089; 5 > 1.090

V	5
---	---

R1	5
----	---

R2	
----	--

R3	
----	--

R4	
----	--

TOTAL GLYCOALKALOID CONTENT (mg. / 100 g. fresh tuber)

V	4.2
---	-----

R1	7.5
----	-----

R2	
----	--

R3	
----	--

R4	
----	--

OTHER QUALITY CHARACTERISTICS: Describe any other quality characteristics that may aid in identification, (e.g. chip-processing, french fry processing, baking, boiling, after-cooking darkening). Please attach data and corresponding protocol.

Post-storage chip processing and hollow heart

	chip color		Hollow Heart (%)
	40 storage	50 storage	
Ivory Crisp	2.0	0.9	17.5
Atlantic	2.6	1.4	1.0

(chip color rated 1-5 where 1=light , =2=acceptable)

11. CHEMICAL IDENTIFICATION:

Describe chemical traits of the candidate variety that aid in its identification (e.g. protein or DNA electrophoresis). Please attach data and the corresponding protocol.

12. ADDITIONAL COMMENTS AND CHARACTERISTICS:

Include any additional descriptors that would be useful in distinguishing the candidate variety.

NAME OF APPLICANT (S) <i>University of Idaho</i>	TEMPORARY OR EXPERIMENTAL DESIGNATION <i>NDO 1496-1</i>	VARIETY NAME <i>Ivory Crisp</i>
ADDRESS (Street and No. or RD No., City, State, Zip Code, and Country)		FOR OFFICIAL USE ONLY PVPO NUMBER #200200157

REFERENCE VARIETIES: Enter the reference variety name in the appropriate box.

Application Variety (V)	Reference Variety 1 (R1)	Reference Variety 2 (R2)	Reference Variety 3 (R3)	Reference Variety 4 (R4)
<i>Ivory Crisp</i>	<i>Atlantic</i>			

PLEASE READ ALL INSTRUCTIONS CAREFULLY:

1. MARKET CHARACTERISTICS:

***MARKET CLASS:**

1 = Yellow-flesh Tablestock 2 = Round-white Tablestock 3 = Chip-processing 4 = Frozen-processing
 5 = Russet Tablestock 6 = Other _____

V	3	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

2. LIGHT SPROUT CHARACTERISTICS: (See Figure 1)

***LIGHT SPROUT: GENERAL SHAPE**

1 = Spherical 2 = Ovoid 3 = Conica 4 = Broad cylindrical 5 = Narrow cylindrical 6 = Other _____

V	1	R1	1	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

***LIGHT SPROUT BASE: PUBESCENCE OF TIP**

1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	2	R1	4	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

***LIGHT SPROUT BASE: ANTHOCYANIN COLORATION**

1 = Green 2 = Red-violet 3 = Blue-violet 4 = Other(describe) _____

V	2	R1	2	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

***LIGHT SPROUT BASE: INTENSITY OF ANTHOCYANIN COLORATION (IF PRESENT)**

1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	3	R1	4	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

*** LIGHT SPROUT TIP: HABIT**

1 = Closed 2 = Intermediate 3 = Open

V	2	R1	2	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

2. LIGHT SPROUT CHARACTERISTICS: (continued)

LIGHT SPROUT TIP: PUBESCENCE

1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	2	R1	5	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

LIGHT SPROUT TIP ANTHOCYANIN COLORATION

1 = Green 2 = Red-violet 3 = Blue-violet 4 = Other(describe) _____

V	1	R1	2	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

LIGHT SPROUT TIP: INTENSITY OF ANTHOCYANIN COLORATION (IF PRESENT)

1 = Absent 2 = Weak 3 = Medium 4 = Strong 5 = Very Strong

V	1	R1	3	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

LIGHT SPROUT ROOT INITIALS: FREQUENCY

1 = Absent 2 = Some 3 = Abundant

V	2	R1	2	R2		R3		R4	
---	---	----	---	----	--	----	--	----	--

3. PLANT CHARACTERISTICS:

GROWTH HABIT: (See Figure 2)

3 = Erect (>45° with ground) 5 = Semi-erect (30-45° with ground) 7 = Spreading

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

TYPE:

1 = Stem (foliage open, stems clearly visible) 2 = Intermediate 3 = Leaf (Foliage closed, stems hardly visible)

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

MATURITY: Days after planting (DAP) at vine senescence

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

PLANTING DATE:

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

*REGIONAL AREA:

1 = Pacific North West (WA, OR, ID, CO, CA) 2 = North Central (ND, WI, MI, MN, OH) 3 = North East (ME, NY, PA, NJ, MD, MA, RI,)
 4 = Mid-Atlantic Erect (VI, NC, SC, South NJ, FL) 5 = South (LA, TX, AZ, NE) 6 = Canada
 7 = Europe 8 = England 9 = Latin America 10 = Brazil 11 = Other _____

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

MATURITY CLASS:

1 = Very Early (<100 DAP) 2 = Early (100-110 DAP) 3 = Mid-season (111-120 DAP) 4 = Late (121-130 DAP) 5 = Very Late (>130 DAP).

V		R1		R2		R3		R4	
---	--	----	--	----	--	----	--	----	--

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EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) University of Idaho	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER ND01496-1	3. VARIETY NAME Ivory Crisp
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) Idaho Agricultural Exp. Station University of Idaho Moscow, ID 83843-4196	5. TELEPHONE (include area code) (208)885-7173	6. FAX (include area code) (208)885-6654
7. PVPO NUMBER <p style="text-align: center; font-size: 1.5em;">#200200157</p>		

8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain. YES NO

9. Is the applicant (individual or company) a U.S. national or U.S. based company? YES NO
 If no, give name of country

10. Is the applicant the original owner? YES NO *If no, please answer one of the following:*

a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)?

YES NO *If no, give name of country*

b. If original rights to variety were owned by a company(ies), is(are) the original owner(s) a U.S. based company?

YES NO *If no, give name of country*

11. Additional explanation on ownership (if needed, use reverse for extra space): Ivory crisp from a North Dakota State University cross and was originally selected in Oregon as part of the Tri-State potato breeding program. The University of Idaho completed the final breeding process and is original owner by definition. According to practices common among universities. The University of Idaho will represent the interests of other contributing universities.

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

EXHIBIT F
DECLARATION REGARDING DEPOSIT

NAME OF OWNER (S) University of Idaho	ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country) Idaho Agricultural Experiment Station PO Box 442337 Moscow, ID 83844-2337	TEMPORARY OR EXPERIMENTAL DESIGNATION ND01496-1 VARIETY NAME Ivory Crisp
NAME OF OWNER REPRESENTATIVE (S) Stephen L. Love	ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country) Aberdeen R&E Center 1693 S 2700 W Aberdeen, ID 83210	FOR OFFICIAL USE ONLY PVPO NUMBER #200200157

I do hereby declare that during the life of the certificate a viable sample of propagating material of the subject variety will be deposited, and replenished as needed periodically, in a public repository in the United States in accordance with the regulations established by the Plant Variety Protection Office.


Signature

27 Feb 08
Date