

Dent Corn and Popcorn
Inbreds and Populations
available from
Iowa State University

2004

Iowa State University Research Foundation, Inc.
(ISURF)

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FOUNDATION SEED

This booklet lists foundation seed, genetic stocks, and breeding populations of maize which are available to seedsmen, plant breeders, and others.

The seed is offered by the Committee for Agricultural Development (the Iowa Foundation Seed Stocks Organization) often referred to by the letters CAD.

The purpose of CAD is to make available seed of new crop varieties beneficial to Iowa agriculture as they are developed and released by Agricultural Experiment Stations. The maintenance of pure seed of these varieties, as they are used by farmers, is a second function of CAD. Also, seed of genetic stocks and breeding populations is distributed as it becomes available from Iowa State University.

SHIPPING INSTRUCTIONS

When ordering seed, please give shipping instructions. If you are planning to call for the seed, please so indicate. If you are ordering field corn inbreds to be shipped, please add the designated amount for postage.

EXPORT ORDERS

Any seed to be sent outside the US must meet the following conditions:

- 1) Intention to ship seed outside the US must be disclosed to ISURF and CAD.
- 2) A signed license agreement must be fully executed with ISURF.
- 3) A clearly legible import permit for the receiving country must be received by CAD. If the import permit is not in English, the direct English translation must be attached.
- 4) All costs must be paid in full prior to shipment. Those costs may include but are not limited to:
 - a) Seed cost.
 - b) Shipping and handling.
 - c) Laboratory test charges to meet import requirements. (Cost varies by test.)
 - d) Cost of seed used for tests. (Typically 400 k or more is needed for each test.)
 - e) Phytosanitary certificate cost.

Due to the involved nature of readying seed for overseas shipment, additional time must be allowed when ordering.

EXPORT ORDERS WILL BE ACCEPTED ONLY WHEN FULL PAYMENT AND ALL CONDITIONS HAVE BEEN MET. Remittance should be made to the Committee for Agricultural Development and mailed to:

2023 Agronomy Hall
Ames, IA 50011-1050

BILLING INFORMATION

For seed not paid for prior to or on the date of shipment or pickup from our warehouse:

ALL ACCOUNTS WILL BE DUE AND PAYABLE ON THE FIRST OF THE MONTH FOLLOWING THE MONTH OF THE DATE OF BILLING. INTEREST AT THE RATE OF ONE AND ONE- HALF PERCENT PER MONTH SHALL BE ADDED TO THE AMOUNT DUE ON THE FIRST DAY OF THE MONTH FOLLOWING THE DUE DATE. THE ANNUAL RATE OF INTEREST ON OVERDUE ACCOUNTS WILL BE 18 PERCENT.

QUESTIONS?

If you have any questions please contact Lynn Henn, CAD foundation seed manager, by phone (515-292-3497), fax (515-292-6272), or email (lhenn@iastate.edu).

DENT CORN INBREDS

The inbred lines of field corn listed below were produced in isolated fields. Although the fields were well isolated and carefully rogued, 100 percent freedom from contamination cannot be guaranteed. It will be necessary for the grower to do a limited amount of roguing and sorting. Seed of these inbred lines has not been treated with a fungicide.

LINES AVAILABLE

Hand pollinated breeder seed of the following inbreds is available postage paid – see request form for prices.

B68	B73	B84	B79	B89	B90	B91
B93	B94	B95	B97	B98	B99	B100
B102	B103	B104	B105	B106	B107	B108
B109	B110	B111	B112	B113	B114	B115
B116	B117	B118	B119	B120	B121	B122
B123	B124	B125				

B79

B79 is a dent line selected from Iowa Two-Ear Synthetic (BS10). B79 has good yield in crosses with Mo17 and related lines. It tends to have two ears per plant, intermediate seed size with reddish color, and seed yield is relatively good. B79 has intermediate resistance to northern corn leaf blight and first- and second-generation European corn borer. Relative maturity of B79 is 1,500 U.S. heat units from planting to flowering. License agreements with ISURF are not required for this variety prior to purchase.

B89

Inbred B89 was developed from a population of Iowa Stiff Stalk Synthetic [BSSS(R)C7] that was improved in a reciprocal recurrent selection program for seven cycles. Inbred B89 is similar to B73 for dates of tassel shedding and silk emergence. Plant and ear heights for B89 are approximately 35 cm lower than for B73. With artificial infestations, B89 has good resistance to first-generation European corn borer, but is susceptible to the second-generation. Under Iowa conditions, B89 has good plant health. The kernel has a shallow dent. In single cross evaluations by the Iowa Agriculture Experiment Station, B89 has shown its best performance with Mo17. It seems to be a line that can be used as either male or female in the production of single-cross seed. Inbreds B73 and B89 are not sister lines.

NO B89, AS AN INBRED OR COMPONENT OF ANY HYBRID, SHALL BE GIVEN OR SOLD OUTSIDE THE UNITED STATES AND CANADA WITHOUT THE KNOWLEDGE AND CONSENT OF THE IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION.

B90

Inbred B90 was developed from a population of Iowa Corn Borer Synthetic / 1 [BSCB1(R)C7] that was improved in a reciprocal recurrent selection program for seven cycles. Consequently, B90 is not closely related to any inbred lines that have been released by the Iowa Agriculture Experiment Station. The line was developed by self-pollination in an ear-to-row breeding system for several generations. Its days to tassel shedding and silk emergence are 2 days

earlier than B73. Plant and ear heights are approximately 25 cm shorter than for B73. With artificial infestations, B90 has good resistance to first-generation European corn borer and intermediate resistance to the second-generation. Plant health is good in Iowa conditions. The kernel has a shallow dent. The inbred seed yield is relatively low; consequently, it should be used as a male parent in the production of hybrid seed. In single-cross evaluation by the Iowa Agriculture Experiment Station, B90 has shown its best performance with B73. Single crosses B73 x Mo17 and B73 x B90 have shown similar yields, but B73 x B90 has had lower grain moisture, less root and stalk lodging, and fewer dropped ears. License agreements with ISURF are not required for this variety prior to purchase.

NO B90 OR B91, AS AN INBRED OR COMPONENT OF ANY HYBRID, SHALL BE GIVEN OR SOLD OUTSIDE THE UNITED STATES WITHOUT THE KNOWLEDGE AND CONSENT OF THE IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION.

B91

Inbred B91 was developed from a population of Iowa Corn Borer Synthetic / 1 [BSCB1(R)C8] that was improved for eight cycles in a reciprocal recurrent selection program. Inbred B91 is related to B90, but is not closely related to any other inbred lines that have been released by the Iowa Agriculture Experiment Station. The line was developed by self-pollination in an ear-to-row breeding system for several generations. The days to tassel shedding and silk emergence are 3 days earlier than for B73. Plant and ear heights are approximately 25 cm shorter than for B73. With artificial infestations, B91 has good resistance to first-generation European corn borer and intermediate resistance to the second-generation. Plant health is good in Iowa conditions. The kernel has a shallow dent. The inbred seed yield is relatively good; consequently, it may be used as either male or female in the production of hybrid seed. In single-cross evaluation by the Iowa Agriculture Experiment Station, B91 has shown its best performance with B73. Single crosses B73 x Mo17 and B73 x B91 have shown similar grain yields, but B73 x B91 has had lower grain moisture, less root and stalk lodging, and fewer dropped ears. License agreements with ISURF are not required for this variety prior to purchase.

NO B90 OR B91, AS AN INBRED OR COMPONENT OF ANY HYBRID, SHALL BE GIVEN OR SOLD OUTSIDE THE UNITED STATES WITHOUT THE KNOWLEDGE AND CONSENT OF THE IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION.

B93

Inbred B93 was developed from the backcross population of (B70 x H99)H99. The line was obtained by self-pollination in an ear-to-row breeding system for several generations. The purpose of the program was to obtain a line more vigorous than H99, particularly for pollen production and seed yield, and at least equal for hybrid performance. Tassel shed and silk emergence are one day later than H99. Pollen production is much better than for H99. Plant and ear heights are similar to H99. B93 is highly resistant to first-generation European corn borer, moderately susceptible to the second-generation, and has good disease resistance in Iowa conditions. The seed has a shallow dent and is much larger than that of H99. Seed yield for B93 is much improved, compared with H99. In single-cross evaluation by the Iowa Agriculture Experiment Station, B93 has shown its best performance in single crosses with A632, B73, and B87. It is similar to H99 for hybrid yield and resistance to stalk lodging, better than H99 for resistance to root lodging, and slightly higher for harvest grain moisture. License agreements with ISURF are not required for this variety prior to purchase.

B94

Inbred B94 was developed from a population of Iowa Stiff Stalk Synthetic, [BSSS(R)C8] that was improved by a reciprocal recurrent selection program for eight cycles. B94 has no close relationship to B73. The line was developed by self-pollination in an ear-to-row breeding system for six generations. Its days to tassel shed and silk emergence are similar to B73. Pollen production is very good. B94 has similar plant height to B73, and ear height is 30 cm shorter. The line has good resistance to first-generation European corn borer and is moderately susceptible to the second-generation. B94 has good plant health in Iowa conditions and good tolerance to heat and drought. The seed, which has a shallow dent, is slightly larger than for B73, and seed yield appears to be about one-half that of B73. In single-cross evaluations by the Iowa Agriculture Experiment Station, B94 has shown its best single-cross hybrid performance with Mo17. The single-cross yield is similar to B73 × Mo17, root and stalk lodging are less, and harvest grain moisture is slightly higher. License agreements with ISURF are not required for this variety prior to purchase.

B95

Inbred B95 was developed from 'Iowa Corn Borer Synthetic No. 1' (BSCB1) after 7 cycles of reciprocal recurrent selection [BSCB1(R)C7-55]. The other population in the reciprocal recurrent selection program was Iowa Stiff Stalk Synthetic [BSSS(R)Cn]. The line was developed by selection and self-pollination in the breeding nursery and included in the crossing nurseries for evaluation in single crosses. B95 has best performance in crosses with B73. B95 flowers 2 days later than B73 and Mo17 and has plant and ear heights similar to B73. Ears have 12 rows of yellow, flinty kernels on red cobs. B95 has intermediate resistance to first-generation European corn borer leaf feeding. License agreements with ISURF are not required for this variety prior to purchase.

B97

Inbred B97 was developed from the Iowa Corn Borer Synthetic No. 1 (BSCB1) after 9 cycles of reciprocal recurrent selection [BSCB1(R)C9-2]. The other population in the reciprocal recurrent selection program was Iowa Stiff Stalk Synthetic S₂ generation. It was one of the parents of the superior half-sib families in testcrosses with BSSS(R)C9. Single crosses that included B97 as one of its parents were above average for yield relative to experiment and check hybrid means. B97 is a tall, vigorous line with above average disease resistance and above average resistance to first- and second-generation European corn borer infestation. Ears have 14 rows of large, yellow dent kernels with red cobs. Ear length is similar to B73. Tassels have good pollen shed under heat and drought stress. B97 has potential as either a male or female parent for hybrid seed production. Maturity classification is AES700-800. License agreements with ISURF are not required for this variety prior to purchase.

B98

B98 was developed from BS11 after 5 cycles of reciprocal full-sib selection [BS11(FR)C5-2803]. The other population in the reciprocal full-sib selection program was BS10. B98 was identified as one of the parents of the superior full-sib families after 5 generations of full-sib family evaluations. The line was included in the breeding nursery at the S₆ generation and 3 generations of selection and self-pollination were made in the ear-to-row method of breeding. B98 exhibits good performance in crosses with B73 and has a tall plant type with dark green, narrow upright leaf orientation. B98 has excellent stay green, suggesting above average resistance to diseases and insects. Plants have a 2-ear tendency and produce at least one ear under stress. Yellow, flinty kernels are produced on ears with 14 to 16 rows. The ears have a red cob, and kernel weight and yield are similar to B73. B98 is a source of germplasm that is

different from that commonly used in breeding programs. Maturity classification is AES800. License agreements with ISURF are not required for this variety prior to purchase.

B99

B99 was developed from Iowa Corn Borer Synthetic No. 1 (BSCB1) after 10 cycles of reciprocal half-sib selection with Iowa Stiff Stalk Synthetic (BSSS) as the tester. B99 was a selection [BSCB1(R)C10-7233] that was used to form BSCB1(R)C11. BSCB1(R)C10-7233 was included in the breeding and topcross nurseries at the S₁ generation. On the basis of testcross performance, the line was advanced ear-to-row in the breeding nursery and evaluated in single crosses. B99 exhibits good performance in crosses with B73 and other BSSS related lines. B99 flowers 2 days earlier than B73, has plant and ear heights similar to B73, and ears have 12 to 14 rows of yellow, dent kernels on red cobs. Yield is similar to Mo17. B99 has good plant health with average root and stalk strength and with average resistance to first-generation European corn borer. B99 has greater potential as a male parent in production of single-cross seed. Maturity classification is AES800. License agreements with ISURF are not required for this variety prior to purchase.

B100

B100 was developed from a cross of B85 and H99[(B85 × H99)H99-361]. Selection was tested with A632 as tester. Based on testcross performance, the selection was advanced ear-to-row by four generations of self-pollination and evaluated in single-cross trials with A632, A681, B87, and SD40. Flowering time of B100 is similar to A632 and four days later than A681. Pollen production is excellent, seed yields are similar to A681, plant and ear heights are 20 to 30 cm less than A632 and A681. B100 has good plant health and easy to maintain. Maturity classification is AES600. License agreements with ISURF are not required for this variety prior to purchase.

B102

B102 was developed from a cross of B85 and H99. B85 was developed from BSCB6 (PA Early Syn) to provide a source of greater resistance to first-generation corn borer with earlier maturity. H99 was developed from IL Syn. (Oh43) and was used in cross because of good root strength and good general combining ability. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B103

B103 was derived from Pool 41, which was developed by CIMMYT. Pool 41 (NTR-1) is a genetically broad-based gene pool for the northern temperate region (46° - 52° N and S). Pool 41 includes 255 components, dominated by U.S. germplasm sources, but materials from Korea, Lebanon, and China also were included. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B104

B104 was developed from a strain [BS13(S)C5] of Iowa Stiff stalk Synthetic. BS13 (S)C5 has undergone seven cycles of half-sib recurrent selection with IA13 as tester [BS13(H)C&] followed by five cycles of S₁-S₂ recurrent selection to form BS13(s)C5. Hence, B104 was derived from BS13(S)C5 after 12 cycles of recurrent selection. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B105

B105 was developed from a strain [BSSS(R)C9] of Iowa Stiff Stalk Synthetic after nine cycles of reciprocal half-sib recurrent selection. Iowa Corn Borer Synthetic No. 1 [BSCB1(R)C9] was the tester population for developing the half-sib families within BSSS(R). License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B106

B106 was developed from BS26. BS26 is a population of primarily Lancaster Sure Crop germplasm developed by intercrossing 13 inbred lines with five genetically broad based populations. The crosses were intermated five generations to form BS26. All of the inbred lines and populations included to form BS26 were classified in the Lancaster Sure Crop heterotic group. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B107

B107 was developed from Pool 41, which is a genetically broad-based population developed for temperate areas of the world by the CIMMYT maize breeding program. B107 includes germplasm different from that commonly used in the U.S. Corn Belt breeding programs, and has good dry-down after physiological maturity, and has above average combining ability in crosses with lines from Iowa Stiff Stalk Synthetic (BSSS) and non-BSSS heterotic groups. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B108

B108 was developed from Pool 41, which is a genetically broad-based population developed for temperate areas of the world by the CIMMYT maize breeding program. B108 includes unique germplasm than that commonly used in the U.S. Corn Belt breeding programs, and has good dry-down after physiological maturity, and has above average combining ability in crosses with lines from Iowa Stiff Stalk Synthetic (BSSS) and non-BSSS heterotic groups. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B109

B109 is a recovered B73 that has exhibited improved combining ability in crosses, has similar grain moisture at harvest, and similar root and stalk strength as B73. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B110

B110 was derived by single-seed descent from BS13(S)C5, a strain of BSS that has undergone 12 cycles of recurrent selection for primarily grain yield. B110 is a vigorous line that has excellent plant health: above average to first- and second-generation European corn borer and early infection by gray leaf spot, and northern corn leaf blight. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B111

B111 was derived by single-seed descent from BSSS(R)C9, a strain of BSSS, that had undergone nine cycles of reciprocal half-sib recurrent selection with BSCB1(R). B111 is a vigorous health line that seems to possess tolerance to the European corn borer, gray leaf spot, and northern corn leaf blight. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B112

B112 was derived from BSCB1(R)C11, a strain of BSCB1 that had undergone 11 cycles of reciprocal half-sib recurrent selection with BSSS(R). B112 is a vigorous line with good early plant health. It is susceptible to second-generation European corn borer and northern corn leaf blight. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B113

B113 was derived from BS11(FR)9, a strain of BS11 that had undergone nine cycles of reciprocal full-sib recurrent selection with BS10. B113 is a vigorous line with excellent plant health with leaves that have an upright-leaf orientation with light green color. It seems to have above average tolerance to first- and second-generation European corn borer, gray leaf spot, and northern corn leaf blight. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B114

B114 was derived from the same program from which B103, B107, and B108 were developed. B114 seems to contribute to fast dry-down in crosses. It is susceptible to second-generation European corn borer but seems to have tolerance to first-generation European corn borer, gray leaf spot, and northern corn leaf blight. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B115

B115 was developed from BS11, a source that is different from most U.S. Corn Belt germplasm. It exhibits excellent plant health, indicating a good tolerance to most fungal leaf diseases and European corn borer. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B116

B116 was developed from the cross of B97 and B99, both lines that have been released from the Iowa State University corn breeding program. In the F2 generation of the B97 × B99 cross, B116 was developed via the typical pedigree selection methods. After extensive testing in Iowa and North Central Regional trials, B116 has exhibited superior performance for yield in testcross and single-cross trials. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B117

B117 was developed by pedigree selection from an F2 population from the cross of B97 × B99. After testing in testcross and single-cross trials, B117 exhibited good combining ability and consistent high performance. B117 would be included in the non-BSSS heterotic group and

has potential as a male parent of hybrids. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B118

B118 was developed by pedigree selection from an F2 population from the cross of B97 × B99. After testing in testcross and single-cross trials, B118 exhibited good combining ability and consistent high performance. B118 would be included in the non-BSSS heterotic group and has potential as a male parent of hybrids. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B119

B119 was developed by pedigree selection from BS13(S)C7, which is a strain of Iowa Stiff Stalk Synthetic that has been under recurrent selection since 1939. B119 is a vigorous healthy line that has good, consistent yield performance in crosses to lines from the non-BSSS heterotic group. B119 has been a parent of crosses that have performed well compared with checks. It has the potential to be used either as a seed parent to produce hybrid seed or alternative germplasm source to include in elite × elite line crosses for pedigree selection. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B120

B120 was developed by pedigree selection from BSCB1, an elite synthetic variety that has been under selection since 1949. B120 is included in the non-BSSS heterotic group and has potential use as a male pollinator or source of germplasm in pedigree selection programs. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B121

B121 was developed by pedigree selection from BS13(S)C6, which has been under continuous selection since 1939. After extensive testing, B121 had consistently good performance over a broad range of environments, from Texas to Delaware (NCR-167 trials in 2002). B121 is included in the BSSS heterotic group. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B122

B122 was derived from a narrow base synthetic (BSKRL2) composed of the five inbreds B90, B91, B95, B97, and B99. B122 has performed well on commercial tester inbreds from the stiff stalk heterotic pattern. It has better or comparable dry down, improved root and stalk lodging, and equivalent or better yield (depending on the tester) than comparable commercial checks. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B123

B123 was derived from a narrow base synthetic (BSKRL2) composed of the five inbreds B90, B91, B95, B97, and B99. B123 has performed well on commercial tester inbreds (particularly SGI912) from the stiff stalk heterotic pattern. It has better or comparable dry down, improved root and stalk lodging, and equivalent or better yield (depending on the tester) than comparable

commercial checks. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B124

B124 was derived from a narrow base synthetic (BSKRL2) composed of the five inbreds B90, B91, B95, B97, and B99. B124 has performed well on commercial tester inbreds (particularly SGI912) from the stiff stalk heterotic pattern. B124 has shown a susceptibility to root lodging, but did show strong consistent yield on SGI912 winning in all 10 locations in 2002. In crosses with SGI912, B124 ranked 11TH for grain yield (12 bu/ac less than the top commercial check.) License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

B125

B125 was derived from a narrow base synthetic (BSKRL2) composed of the five inbreds B90, B91, B95, B97, and B99. B125 has performed well on commercial tester inbreds from the stiff stalk heterotic pattern and seems to perform well with a broader range of testers than B122, B123, or B124. B125 has had outstanding resistance to root and stalk lodging and excellent dry down at harvest. When crossed with SGI890, B125 ranked 3RD overall in the test for yield and was in the bottom ? driest for grain moisture. License agreements with ISURF are required for this variety prior to purchase. Royalties for commercial purposes are \$3.00 per MVK planted.

DENT CORN INBRED LINES AVAILABLE AS GENETIC STOCKS

LINES AVAILABLE

The following inbred lines are available at \$50 per unit of 100 kernels, postage paid. Offering seed as a genetic stock indicates the seed will be available as long as the supply lasts. There will be no further increase or distribution of the seed. Genetic stocks are generally not considered to be agronomically acceptable for incorporation into hybrids without additional breeding.

B52

This inbred is highly resistant to infestation by second-generation of European corn borer. It has a vigorous plant type, medium ear size and a very hard stalk, but sheds only a small amount of pollen. Its maturity is adapted to south central and southern Iowa. The source of the line is unknown. License agreements with ISURF are not required for this variety prior to purchase.

B75

This inbred is a selection from Iowa Corn Borer Synthetic #3. It is highly resistant to leaf feeding by first-generation European corn borer, but is moderately susceptible to leafsheath and collar feeding by second-generation. It has good field resistance to sorghum downy mildew, moderate resistance to southern corn leaf blight (race 0) and northern corn leaf blight, and low-level resistance to maize dwarf mosaic and maize chlorotic dwarf. The tassel has only one or two lateral branches, but the pollen production is adequate. The date of silk emergence is 2-3 days earlier than B14A. The seed is relatively large and yield is good. Several tests for 3 years in north-central and south-central Iowa have shown that B75 does not contribute high root strength to hybrids. Also, although it has good resistance to stalk rots, stalk strength in hybrids is only average. Although no dent corn seed offered for sale has been treated with a fungicide, it is recommended that this inbred especially should have that protection. License agreements with ISURF are not required for this variety prior to purchase.

B85

Developed from Iowa Corn Borer Synthetic #6 (now BSCB6, formerly Pa. Early Synthetic C3) by selection and self-pollination in the ear-to-row system for more than 8 generations. The plant has an erect-leaf orientation and is single-eared. The date of silk emergence is 2 days earlier than A632. Pollen production and seed yield are satisfactory. The ear is relatively small and the seed is flinty. Inbred B85 is highly resistant to leaf feeding by first generation of the European corn borer. Single-cross evaluations in northern Iowa for 3 years have shown that it has good combining ability for grain yield and stalk strength, but it does not have satisfactory root strength. License agreements with ISURF are not required for this variety prior to purchase.

B86

Inbred B86, a maize inbred line, was developed from the single cross B52 × Oh43. Inbred Oh43 contributed resistance to leaf feeding by the first-generation of European corn borer, and B52 contributed resistance to sheath and collar feeding after silk emergence by the second-generation plus some resistance to the first-generation. Beginning with the F₂ of B52 × Oh43

and continuing through the F₅ generation, the inbred line was developed by selection and self-pollination in the ear-to-row system.

Artificial infestation of the corn borer was used in all generations. Evaluations of B86 in 2 seasons have shown that it is highly resistant to the first-generation and almost as resistant as B52 to the second-generation. It is the only public line of central U.S. Corn Belt maturity that is known to combine both types of resistance into one genotype. The plants have ears of intermediate size, and the seed is flinty. Pollen production and seed yield are satisfactory. Preliminary evaluations in single-cross hybrids in central Iowa have shown above-average yields but only average stalk and root strength. The stalk of the inbred plant may be brittle in the pre-silk stage of plant development. The primary use for B86 will be in breeding programs as a source of resistance to the European corn borer for the whole life of the plant. The maturity classification is AES800. License agreements with ISURF are not required for this variety prior to purchase.

B87

This inbred line was selected from BS22, which is a synthetic that has a maturity similar to A619 × A632. The line has been developed by selection and self-pollination in the ear-to-row system for five generations. The date of silk emergence is 1 to 2 days earlier than the Iowa Agriculture Experiment Station strain of A632. With artificial infestation of first-generation European corn borer, B87 has a rating of 3 (1 = highly resistant, 9 = highly susceptible) for resistance to leaf feeding. Also, the plant shows good resistance to diseases in central Iowa. Plant height is similar to A632, but ear placement is slightly lower. Pollen production and seed yield are good. The plants will produce a high frequency of second ears when the plant density is less than 40,000 plants/ha. The ear is slender with a length similar to A632 and most ears have 12 kernel rows. The kernel has a smooth, shallow dent and intermediate yellow color. Inbred B87 seems to be a line that seed producers can use in single-cross seed production, either as male or female, and is early enough that it can be used in northern Iowa. License agreements with ISURF are not required for this variety prior to purchase.

B88

Inbred B88 was developed from synthetic BS6(RC)C2, which is an improved version of BS6 that was obtained by crossing BSSS(R)C5 and BSCB1(R)C5. Inbred B88 is similar to B73 for dates of pollen shed and silk emergence. Pollen production may be sparse and seed yield is frequently low, evidently because of slow or incomplete silk emergence. In crosses with either B73 or Mo17 the yield is similar to B73 × Mo17. Generally, crosses of B88 have given similar or better resistance to root and stalk lodging than have comparable crosses of B73. Also, studies with high plant densities have shown that B88 contributes to hybrids strong resistance to barrenness. It is unlikely that this line can be used in a hybrid seed production program, but it should be a useful stock in a pedigree breeding program. License agreements with ISURF are not required for this variety prior to purchase.

B92

Inbred B92 was developed from the backcross population of (B70 × H99) B70. The line was obtained by self-pollination in an ear-to-row breeding system for several generations. The purpose of the program was to obtain a line similar in hybrid performance to B70 but with improved resistance to lodging. Tassel shed and silk emergence are 4 days earlier than B73. Pollen production is good. Plant and ear heights are 40 to 30 cm shorter, respectively, than B73. B92 is resistant to first-generation European corn borer, moderately susceptible to the second-generation, and has good resistance to disease in Iowa conditions. Hybrid performance of B92 is best in a single cross with B73. Compared with B73 × Mo17, B92 ×

Mo17 yields 4 percent higher and has better root strength, released as a germplasm line, rather than a parental line, because it is unstable for plant growth. The cause of the genetic similar stalk strength, fewer dropped ears, and higher harvest grain moisture (probably because of slower drying). The genetic instability causes slow growth thus giving a variable plant size and smaller tassels. With greatest expression, there is no ear development. Heat and drought stresses before tassel emergence cause the effects of the instability to be accentuated. The condition seems to be completely recessive because in F₁ crosses no abnormal plants are evident. License agreements with ISURF are not required for this variety prior to purchase.

B101

B101 is a yellow dent inbred line developed by single-seed descent from Iowa Stiff Stalk Synthetic (BSSS) that was designated as BSSS-53. B101 was identified as having higher levels of methionine. Relative to total protein (whole kernel) of B101, 39.5 grams per kilogram was methionine. B101 should be considered as a germplasm source with higher levels of methionine. Maturity classification of B101 is late AES800. License agreements with ISURF are not required for this variety prior to purchase.

C.I. 31A

Selected from the open-pollinated variety Midland. It is highly resistant to leaf feeding by first generation of the European corn borer. Pollen shedding is usually good and seed production is good. The maturity is late AES800. License agreements with ISURF are not required for this variety prior to purchase.

B96

B96 is an orange flint inbred line known originally as 41.2504B, which was originally collected in Argentina. B96 is highly resistant to feeding by the first-generation European corn borer. B96 should be used as a donor parent because it has poor roots, poor pollen shed, small ears with small flinty seeds, and it is difficult to maintain in most conditions.

B96 can be obtained from:

North Central Regional Plant Introduction Station
Iowa State University, Ames, IA 50011

LH38, LH39 AND DERIVED LINES

The following lines are available in 100k packets at a cost of \$80 per packet. Please order by IRF designation.

INBRED	EXP. DESIGNATION	DERIVATION
IRF310	15-1	(PA91/LH98)GA-6-420-64-2-1-1-2-1
IRF311	15-8	(PA91/LH98)GA-6-420-64-2-1-3-3-1
IRF312	15-9	(LH98/VA22)GA-5-1349-134-2-1-3-1
IRF313	15-12	Oh43Syn. ERGII-1-DH2-12904-152-4-1-1-1-1
IRF314	15-13	(PA91/LH98A)-6-420-64-2-1-3-1-1-1
IRF315	15-14	(PA91/LH98A)-6-420-64-2-1-3-4-1-1
IRF316	15-15	(PA91/LH98A)-6-420-64-2-1-1-5-1-1
IRF317	15-16	(PA91/LH98A)-6-420-64-2-1-1-2-2-1
IRF318	15-17	(PA91/LH98A)-6-420-64-2-1-3-3-1-1
IRF319	15-18	(PA91/LH98)GA-6-420-64-2-1-1-5-2
IRF320	15-19	LH40(VA22)D4-4-2928-86-1-1-2-1
IRF321	15-20	Oh43Syn. ERGII-1-DH2-12904-136-1-1-1-1

Additional data are available in the Corn Yield Trial Catalog and on-line at www.ag.iastate.edu/centers/cad for selected advanced lines.

Average Performance of 28 CAD testcrosses and two check hybrids evaluated at three Iowa locations (Calumet, Kanawha, and Nashua) with three replications at each location in 2000.

HYBRID PEDIGREE	YIELD Bu / Acre	STAND Plants / Acre	GRAIN MOISTURE %	ROOT LODGING %	STALK LODGING %	DROPPED EARS %
SGI742 / IRF311	161.6	25,941	21.9	0.3	4.1	0.0
SGI742 / IRF315	153.8	27,074	21.2	0.9	5.1	0.0
SGI742 / IRF316	150.9	24,727	21.9	0.0	1.7	0.3
SGI742 / IRF317	149.9	25,455	21.1	2.3	3.4	0.0
SGI742 / IRF310	148.5	25,779	22.0	0.3	2.8	0.0
SGI742 / IRF314	148.8	25,860	22.1	1.5	3.1	0.3
SGI742 / 15-7	147.4	25,698	21.8	0.9	2.7	0.3
SGI742 / IRF313	149.8	25,374	24.3	0.3	3.5	1.6
SGI742 / IRF319	146.1	24,888	22.6	0.0	2.1	0.0
SGI742 / 15-6	144.3	26,022	21.4	1.6	4.2	0.0
SGI742 / 15-11	144.3	25,779	21.8	1.5	3.1	0.0
SGI742 / IRF318	143.2	25,941	22.7	0.0	5.4	0.0
FR1064 / IRF310	145.0	23,877	24.6	1.1	1.6	0.0
FR1064 / LH185	140.2	24,079	21.9	1.3	2.8	0.3

HYBRID PEDIGREE	YIELD Bu / Acre	STAND Plants / Acre	GRAIN MOISTURE %	ROOT LODGING %	STALK LODGING %	DROPPED EARS %
FR1064 / IRF315	140.0	22,784	23.0	0.3	1.7	0.0
FR1064 / IRF317	141.9	24,079	24.2	1.1	3.5	0.3
FR1064 / IRF316	140.2	24,160	24.5	0.0	2.6	0.0
FR1064 / 15-6	137.9	24,646	23.2	0.0	2.3	0.0
FR1064 / IRF311	137.0	25,374	23.6	0.9	1.9	0.0
FR1064 / IRF318	136.3	21,125	23.8	0.0	1.9	0.0
FR1064 / IRF314	131.4	22,744	22.7	0.3	3.2	0.0
FR1064 / IRF319	135.0	25,617	25.3	0.0	3.2	0.0
SGI742 / FR651	126.9	23,917	20.6	0.7	7.0	0.0
FR1064 / 15-10	130.6	23,594	21.9	4.4	4.6	0.3
SGI742 / 15-10	125.1	26,588	21.3	3.0	2.2	2.1
FR1064 / 15-7	126.6	24,241	23.9	0.4	3.6	0.0
SGI742 / IRF312	126.9	25,941	25.8	10.8	7.3	0.3
FR1064 / 15-11	114.6	22,258	23.0	0.0	1.7	0.0
FR1064 / IRF313	113.0	18,616	24.1	0.5	1.4	0.0
FR1064 / IRF312	112.5	23,189	24.8	4.7	4.1	0.0
Average	138.2	24,524	22.9	1.3	3.3	0.2
LSD (0.05)	12.5	106	1.6	2.3	2.9	0.9

The following inbreds are \$50.00 per 100 kernel unit. Due to limited supply on some inbreds you may only receive 50k instead of 100k. The price quoted for 100k will be the same for the 50k in these situations.

INBRED	PEDIGREE
LH38	A619 x L120
LH39	Oh43 x L120
LH104	A619 x L120
LH109	LH7 x LH38
IRF185	LH7 x LH38
IRF233	LH19 x LH39
IRF236	LH19 x LH39
IRF240	LH7 x LH38
IRF252	LH7 x LH38
IRF291	A671 x LH38

Please call 515-292-3497 for availability.

DENT CORN BREEDING POPULATIONS FOR USE AS GENETIC STOCKS BY CORN BREEDERS

LINES AVAILABLE

The following synthetic stocks are available at \$80 for 500 kernels, postage paid. A brief description of each follows:

BSCAD-1

("P" population × LH170): "P" population was developed by intermating equally eight Pioneer hybrids. The intermated population of eight Pioneer hybrids was used as male parent in an isolation field with inbred LH170 as the female. LH170 was derived from a cross of EX139 × LH38, or Oh43 germplasm. LH170 would represent 50% of the pedigree and the male would be pollen from the "P" population. Two additional generations of intermating by hand pollination within 500-plants were completed. BSCAD-1 has light green plant color, few tillers, low ear placement, about 50% red and 50% white cobs, yellow grain, and pollinations usually are completed by mid-July. License agreements with ISURF are required for this variety prior to purchase.

BSCAD-2

("P" population × Exp 1687): "P" population was developed by intermating equally eight Pioneer hybrids. The intermated population of eight Pioneer hybrids was used as male parent in an isolation field with inbred Exp. 1687 as the female. Exp. 1687 was derived from Oh43 germplasm. Exp. 1687 would represent 50% of the pedigree and the male would be pollen from the "P" population. BSCAD-2 tends to have multiple ears, low ear placement, upright leaf orientation, some silk delay, primarily red cobs, yellow grain and pollinations usually are completed by mid-July. Two additional cycles of intermating by hand pollination within 500-plants were completed. License agreements with ISURF are required for this variety prior to purchase.

BSCAD-3

A synthetic population that was developed by intermating 20 lines that included primarily Oh43 germplasm. The selection of the 20 lines to intermate was based on their testcross performance. The bulk-entry method of intermating the 20 lines was used. The initial intermating of selected lines was done in Puerto Rico followed by intermating in an isolation field. A bulk of 1,000 ears was harvested from the isolation field, shelled, thoroughly mixed, and designated as BSCAD-3. BSCAD-3 has vigorous, attractive plants, large ears with bright yellow semi-dent seeds, good root and stalk strength, and relatively good resistance to foliar leaf diseases. License agreements with ISURF are required for this variety prior to purchase.

BSCAD-4

A synthetic population was developed by intermating 10 inbred lines, in which Oh43 germplasm was common to all lines. Selection of the 10 inbred lines was based on testcross trials with LH226 as tester conducted at three Iowa locations in 1999. The 10 selections had superior yields and acceptable root and stalk strength. Pedigrees of the 10 selected lines were six lines derived from the cross of (PA91 × LH98), two lines developed from Oh43 Syn., one line from the cross of (LH40 × VA22), and one line from the cross LH98 × VA22). Each of the 10 lines also exhibited excellent plant health and vigor as lines themselves. The bulk-entry method of

intermating was completed by hand pollination in the 2000 summer nursery. Prior to shelling, the number of cross-pollinated ears were counted and balanced bulks were formed by taking 2 kernels from each ear (ca. 600 seeds). One balanced bulk was intermated in 2000-2001 Puerto Rico winter nursery by hand pollination. License agreements with ISURF are required for this variety prior to purchase.

BS11(5-S1)C5

BS11(5-S1)C5 was developed by five cycles of S_1 recurrent selection. The general procedure was to self approximately 50 S_0 plants in the winter nursery. Twenty-five random S_1 ears with adequate seed set were retained for inclusion in the yield trials. Remnant S_1 seed of the five selected lines was intermated in the winter nursery using the bulk-entry method. The resulting Syn-1 population was random mated, by chain sibbing 300 to 400 plants, to form the Syn-2 population. The Syn-2 population was used to initiate the next cycle of selection. Two years were needed to complete one cycle of selection. This procedure was repeated until the BS11(5-S1)C5 Syn-2 population was formed. Progress from selection has been evaluated through Cycle 4. The BS11(5-S1)C4 population is significantly lower yielding than BS11C0, probably because of inbreeding depression due to small effective population size. License agreements with ISURF are required for this variety prior to purchase.

BS11(10-S1)C5

BS11(10-S1)C5 was developed by five cycles of S_1 recurrent selection by using a procedure similar to that used to develop BS11(5-S1)C5. The main difference is that 50 lines were evaluated from each cycle and the best 10 selected lines were intermated to form the next cycle population. The BS11(10-S1)C4 population has been significantly improved, in comparison with BS11C0, for all agronomic traits. The important improvements were increased grain yield, lower grain moisture at harvest, increased resistance to stalk lodging, and earlier silk emergence. License agreements with ISURF are required for this variety prior to purchase.

BS11(S1)C5

BS11(S1)C5 was developed by five cycles of S_1 recurrent selection by using a procedure similar to that used in BS11(5-S1)C5. The major difference was that 100 progenies were evaluated and the best 20 selected lines were intermated to form the next cycle population. The BS11(S1)C5 population is agronomically one of the best populations of the group. Grain yield of BS11(S1)C5 is similar to BS11(10-S1)C4 and is slightly wetter at harvest, but has significantly greater resistance to root and stalk lodging, lower plant and ear heights, and has earlier silk emergence. License agreements with ISURF are required for this variety prior to purchase.

BS11(30-S1)C5

BS11(30-S1)C5 was developed by five cycles S_1 recurrent selection using a procedure similar to that used for BS11(5-S1)C5. The major difference was that 150 progenies were evaluated and the best 30 selected lines were intermated to form the next cycle population. The BS11(30-S1)C4 population is similar to BS11(10-S1)C4 for grain yield and other agronomic traits, except that it has slightly earlier silk emergence. License agreements with ISURF are required for this variety prior to purchase.

BS11(S2)C5

BS11(S2)C5 was developed by five cycles of S_2 recurrent selection. The general procedure was to self 200 to 300 S_0 plants in the winter nursery. The following summer the S_1 lines were

grown ear-to-row in the breeding nursery. All rows were inoculated at the 8- to 10-leaf stage with European corn borer larvae [*Ostrinia nubilais* (Hübner)] and rated prior to anthesis for resistance to whorl-leaf feeding. Generally, 30 to 50 percent of the lines were discarded prior to anthesis on the basis of resistance to whorl-leaf feeding and other agronomic traits such as plant and ear height, disease resistance, etc. Three to five plants were self-pollinated in the remaining lines. At harvest, seed from an ear of a single plant was kept for inclusion in yield trials. Criteria for choosing among pollinated plants within a row included seed set, ear rots, and lodging. Remnant S₂ seed of the 20 selected lines was intermated using the bulk-entry method. The resulting Syn-1 population was random mated, by chain sibbing 300 to 400 plants, to form the Syn-2 population. The next cycle of selection was initiated by using the Syn-2 population. Three years were needed to complete one cycle of selection. This procedure was repeated until the BS11(S2)C5 Syn-2 population was formed. The BS11(S2)C4 population is the highest yielding population of the group. For other agronomic traits, the population is similar in performance to BS11(30-S1)C4, except that it is more resistant to stalk lodging and has earlier silk emergence. License agreements with ISURF are required for this variety prior to purchase.

BS11(MER)C5

BS11(MER)C5 was developed by five cycles of modified ear-to-row selection. The procedure was similar to the one suggested by Compton and Comstock in that there was selection on both the male and female gametes and two years were needed to complete one cycle of selection. Progenies were developed for the first cycle of selection by harvesting ears from a population allowed to open-pollinate in isolation. One-hundred ears were harvested and planted in yield trials the following year. The 20 selected lines were intermated by planting remnant half-sib seed ear-to-row in isolation as females and planting a bulk of the 20 selected lines as the male. Five ears, selected on the basis of grain yield and other agronomic traits, were harvested from each of the 20 female rows. The one hundred ears were planted in yield trials the following year as the evaluation phase of the next cycle of selection. The Syn-1 population was formed by harvesting an equal number of ears (10 to 15) from each female and bulking equal quantities of seed from each ear. The resulting Syn-1 population was random mated, by chain sibbing 300 to 400 plants, to form the Syn-2 population. The BS11(MER)C5 population is similar in performance to BS11(S2)C4, except that it has slightly taller plant and ear heights, and has later silk emergence. License agreements with ISURF are required for this variety prior to purchase.

BS11(HI)C5

BS11(HI)C5 was developed by five cycles of half-sib selection using the inbred tester B79. The general procedure was to self 200 to 300 S₀ plants in the winter nursery. The resulting S₁ lines were planted ear-to-row in the summer breeding nursery. The lines were inoculated with European corn borer larvae and evaluated for resistance to whorl-leaf feeding prior to anthesis. Approximately 30 to 50 percent of the lines were discarded prior to anthesis. Two plants in the remaining lines were selfed and crossed to four plants of B79. At harvest, only one selfed ear and the corresponding testcross seed was kept for evaluation. Remnant S₁ seed of the 20 selected lines was intermated using the bulk-entry method. The resulting Syn-1 population was random mated, by chain sibbing 300 to 400 plants, to form the Syn-2 population. The next cycle of selection was initiated by using the Syn-2 population. Three years were needed to complete one cycle of selection. This procedure was repeated until the BS11(HI)C5 Syn-2 population was formed. Grain yield of BS11(HI)C4 was not significantly different from BS11C0, improvements were made for other agronomic traits. License agreements with ISURF are required for this variety prior to purchase.

BS11(FS)C5

BS11(FS)C5 was developed by five cycles of intrapopulation full-sib selection. For the first cycle of selection, full-sib families were developed in the winter nursery. The following summer, 100 full-sib families were evaluated and the best 20 families were selected. Remnant seed of the 20 selected full-sib families was self-pollinated in the winter nursery to produce S₁'s of the full-sib families. The following summer, the S₁ full-sib families were intermated using the bulk-entry method. Simultaneously, full-sib families were developed for evaluation for the next cycle of selection by making up five sets of reciprocal full-sibs per pair in the bulk-entry intermating. Thus, one cycle of selection was completed in two years. BS11(FS)C5 was not significantly higher yielding than BS11C0. BS11(FS)C5, however, was significantly lower than BS11C0 for grain moisture at harvest, had increased resistance to root and stalk lodging, had lower plant and ear heights, and was earlier to silk. License agreements with ISURF are required for this variety prior to purchase.

The following synthetic stocks are available at \$50 for 500 k, postage paid. A brief description of each follows:

BS9(CB)C5

This synthetic was developed by recombining the following 10 inbred lines: B49, B50, B52, B54, B55, B57, B68, C.I.31A, Mo17, and SD10. Only one of these lines, B68, has any relationship to inbred lines derived from Iowa Stiff Stalk Synthetic. Recurrent selection, based upon S₁ line evaluation was used for 5 cycles to improve this synthetic for resistance to both the first and second generations of the European corn borer. In all cycles, evaluations of the S₁ lines were made in separate experiments by using artificial infestations of the first- and second-generations of the corn borer. The improved synthetic, BS9(CB)C5, is highly resistant to first-generation corn borer and resistant to second-generation corn borer. Also, it is slightly earlier than the original BS9. License agreements with ISURF are required for this variety prior to purchase.

BS10(FR)C10

A synthetic that was developed by 10 cycles of reciprocal full-sib selection for yield from BSTE (Iowa 2-ear Synthetic #1) with PHPRC, also a 2-ear synthetic, as the tester. Eighteen S₅ lines of the superior yielding S₄ × S₄ hybrids and 6 additional lines that had good stalk quality and resistance to leaf feeding by the European corn borer, *Ostrinia nubilalis* (Hubner), were intermated to form the C1 population. The C2 to C10 populations were developed by intermating 20 S₁ lines, which were the parents of the 20 superior yielding full-sib progenies originating from the previously selected populations. BS10(FR)C10 is superior to BSTE in yield, prolificacy, and stalk quality. License agreements with ISURF are required for this variety prior to purchase.

BS12(HI)C8

An improved population of an open-pollinated variety known as Alph. Alph is an extremely variable, long-eared variety from southern Iowa, and does not resemble any of the open-pollinated varieties in our collection. Recurrent selection for specific combining ability with inbred B14 as the tester has been used for 8 cycles to improve Alph. The hybrid yield performance of BS12(HI)C8 × B14 is comparable to commercial single-crosses. Also, BS12(HI)C8 adds valuable genetic diversity to the maize germplasm pool of the North Central Corn Belt. License agreements with ISURF are required for this variety prior to purchase.

BS13(S)C7

This improved breeding population was developed from Iowa Stiff Stalk Synthetic (BSSS) by 14 cycles of recurrent selection for increased yield. Seven cycles of recurrent selection for general combining ability for yield with Ia13 double cross [(L317 × BL349) × (BL345 × MC401)] as a tester in BSSS(HT) were followed by a cycle of full-sib selection for corn borer resistance, cold tolerance and prolificacy. This improved breeding population was redesignated BS13(S) and 4 cycles of S₂ selection and 2 cycles of S₁ selection have been completed. Screening among and within S₁ lines for corn borer resistance and stalk-rot resistance was done in selecting elite material for the S₂ yield trials. BS13(S)C5 combines well with BS12(HI)C8, BS18, BSCBI(R)C12, and BSSS(R)C12. License agreements with ISURF are required for this variety prior to purchase.

BS16(CB)C4

Four cycles of recurrent selection based on evaluations of S₁ lines in replicated experiments were used to improve BS16(S2)C2 for resistance to first- and second-generations of the European corn borer. BS16 was developed by 6 cycles of mass selection for adaptiveness in 'Eto Composite', and BS16(S2)C2 was obtained by 2 cycles of recurrent selection for yield, based on S₂ line evaluations in replicated experiments. In successive cycles of recurrent selection for resistance to corn borer, 226, 225, 295, and 200 S₁ lines were evaluated and recombined 22, 22, 30, and 30 lines to give the successive improved populations. In the final cycle of selection, the average rating of all S₁ lines for first-generation larval feeding was 2.8 (1.0 = highly resistant, 9.0 = highly susceptible) and the range was 2.0 to 8.1. The resistant and susceptible checks rated 2.0 and 7.3, respectively. For larval feeding by the second-generation, the average rating for all lines was 2.9, and the range was 2.0 to 7.3. The resistant check rated 2.0, and the susceptible check rated 9.0. The 30 S₁ lines selected for recombination rated 2.0 for first-generation and 2.4 for second-generation. Consequently, BS16(CB)C4 is expected to have a high level of resistance to the European corn borer for the whole life of the plant. This population is not expected to be a good source for new commercial inbred lines because, with self-pollination, the inbred progenies show too much inbreeding depression and susceptibility to root lodging. However, because the original source, ETO Composite, has a Latin American origin, it is expected that resistance to European corn borer will be conditioned by some different genes than those that condition the resistance in BS17(CB)C4. Therefore, it can be used to obtain lines that have different resistance genes than are present in U.S. Corn Belt germplasm. License agreements with ISURF are required for this variety prior to purchase.

BS17(CB)C4

Four cycles of recurrent selection based on evaluations of S₁ lines in replicated experiments were used to improve the original BS17 for resistance to the first- and second-generations of European corn borer. BS17 is an Iowa Stiff Stalk Synthetic population (BSSS) that was developed by composite crossing of 6 versions of BSSS, each of which has been improved for one or more agronomic traits (yield, resistance to first-generation corn borer, resistance to stalk rots, and tolerance to corn rootworms). Artificial infestations by first- and second-generation corn borer in separate experiments were used to evaluate the S₁ lines for resistance to feeding by the corn borer larvae. Numbers of lines evaluated in the successive cycles were 500, 300, 300, and 280. 30 selected lines were recombined in each cycle to give the improved populations. A selection index comprised of resistance to each generation and days to anthesis was used to select the lines; grain yield of the S₁ lines was an added trait to the selection index in the fourth cycle. In the final cycle of selection, the average rating of all S₁ lines for first-generation feeding was 2.0 (1.0 = highly resistant, 9.0 = highly susceptible), whereas a susceptible check rated 6.2. Also, the same S₁ lines had an average rating of 3.3 (range 2.0 to

6.1) for second-generation feeding. The resistant check, inbred B52, rated 2.0. The average second-generation rating for 30 selected lines was 2.3; consequently, BS17(CB)C4 is expected to have a high level of resistance to the European corn borer for the whole life of the plant and should be an excellent breeding population. The selected S_1 lines in the successive cycles have been continued in the inbred line development program and several have shown good hybrid performance. License agreements with ISURF are required for this variety prior to purchase.

BS18

This population was developed by intermating BSK(S)C7 and BSK(HI)C7, which are two subpopulations of BSK. BSK is a strain of the open-pollinated variety "Krug Yellow Dent" that was developed at the Nebraska Agriculture Experiment Station. S_1 and half-sib recurrent selection were initiated in BSK in 1953. After 7 cycles of S_1 [BSK(S)C7] and half-sib [BSK(HI)C7] recurrent selection, BS18 was developed by intermating 375 plants of BSK(S)C7 and BSK(HI)C7. After the initial crosses, random matings were made by use of controlled hand pollinations in 500 to 1,000 plants for 3 generations. BS18 has good performance as a variety and good combining ability with improved strains of Iowa Stiff Stalk Synthetic. BS18 should be a useful source for the development of new lines in applied breeding programs. License agreements with ISURF are required for this variety prior to purchase.

BS19(S)C2

The corn breeding population BS19(S)C2 was developed from a synthetic that has been designated as Iowa Early Rootworm Synthetic in experimental studies. The original synthetic was developed by combining the following 12 inbred lines: W153R, A239, A251, A265, A297, A417, A556, A632, Ms197, Oh43, R168, and SDIO. A large number of inbred lines were evaluated for corn rootworm tolerance and root traits. These 12 inbreds were selected as parent lines for an early Iowa Synthetic to be used for further studies in resistance or tolerance to corn rootworms. Recurrent selection based on the evaluation of S_1 lines in replicated experiments was used for 2 cycles, resulting in the C2 population. Traits evaluated were root damage from larval feeding, root lodging, root size, and secondary root development. This C2 population should be an excellent source from which breeders can extract early inbred lines that have good tolerance to corn rootworms. The maturity classification is approximately AES500. License agreements with ISURF are required for this variety prior to purchase.

BS20(S)C2

Population BS20(S)C2 was developed from a maize synthetic that has been designated as Iowa Late Rootworm Synthetic in experimental studies. The following 12 inbred lines were combined to develop this synthetic: B14A, B53, B59, B64, B67, B69, B73, N6, N28, R101, HD2286 (BSSS sel.), and 38-11. Following an evaluation of a large number of inbred lines for corn rootworm tolerance and root traits, these 12 inbreds were selected as parent lines for a late Iowa synthetic to be used in further studies in resistance or tolerance to corn rootworms. Recurrent selection based on the evaluation of S_1 lines in replicated experiments was used for 2 cycles, resulting in the C2 population. Traits evaluated were root damage from larval feeding, root lodging, root size, and secondary root development. This synthetic has above-average general combining ability for yield and excellent resistance to root and stalk lodging. The maturity classification is approximately AES800. License agreements with ISURF are required for this variety prior to purchase.

BS21(R)C7

BS21(R)C7 is a genetically broad-based synthetic cultivar developed after six cycles of reciprocal recurrent selection primarily for improved grain yield and root and stalk strength. It is an improved source of corn germplasm for use in areas of higher latitudes or in areas desiring earlier maturity. License agreements with ISURF are required for this variety prior to purchase.

BS22(R)C7

BS22(R)C7 is a genetically broad-based synthetic cultivar developed after six cycles of reciprocal recurrent selection primarily for improved grain yield and root and stalk strength. It is an improved source of corn germplasm for use in areas of higher latitudes or in areas desiring earlier maturity. License agreements with ISURF are required for this variety prior to purchase.

BS23

A composite of annual teosinte and corn germplasm was used as a source of 2-eared inbred lines. The proportion of teosinte germplasm and the maize stocks are not known. Eight inbred lines with good agronomic performance in hybrid combinations were selected and recombined to give a synthetic designated as "Teozea." Teozea was further sib-mated with selection for 2-eared plants for 2 generations. An additional generation of random mating with no selection was used to obtain the seed supply for distribution as BS23. Evaluations have shown that this synthetic silks 3 to 4 days earlier than Iowa Stiff Stalk Synthetic (BSSSCO), has a high frequency of second ears when the plant density is 16,000 plants/acre or less, has a strong "stay-green" characteristic in Iowa, and yields well in crosses with BSSSCO. License agreements with ISURF are required for this variety prior to purchase.

BS26

BS26 was developed by intermating 50 selected S₁ lines from "Lancaster Composite", followed by 3 generations of random mating. Lancaster Composite was developed by intermating 15 inbred lines that included C103 germplasm with 5 populations that included Lancaster Sure Crop germplasm. After 5 generations of intermating, S₁ lines were developed and evaluated for pest resistance, maturity, and agronomic traits. Based on S₁ performance, 400 were advanced to S₂ generation and evaluated per se and in testcrosses with B73 × B84. Index selection was used to determine the 50 S₁ lines intermated to form BS26. This improved population includes germplasm that should be useful in applied breeding programs. License agreements with ISURF are required for this variety prior to purchase.

BS27

BS27 is an adapted population of Antigua Composite obtained originally from the International Maize and Wheat Improvement Center(CIMMYT) located near Mexico City. Antigua is a tropical variety that was adapted to temperate conditions by mass selection for earlier flowering. Mass selection was initiated in 1977 and after 6 cycles of selection Antigua Composite was considered to have maturity appropriate for U.S. Corn Belt environments. BS27 has a vigorous plant type, intermediate height, and ears with flinty kernels that are light yellow to light orange. BS27 has good combining ability with Corn Belt dent cultivars. BS27 includes germplasm that exhibits good pest resistance in tropical areas and includes germplasm that is different from that currently included in U.S. Corn Belt breeding programs. Maturity classification is AES800. License agreements with ISURF are required for this variety prior to purchase.

BS28

BS28 is an adapted population of Tuxpeno germplasm. Samples of five strains of Tuxpeno were obtained from CIMMYT, five samples were bulked, planted in isolation, and allowed to intermate to form Tuxpeno Composite. Mass selection was initiated in Tuxpeno Composite for earlier flowering in 1987. After six cycles of selection, the selected strain of Tuxpeno Composite was designated as BS28. BS28 includes germplasm that is considered one of the more important tropical races because of its good combining ability. BS28 could be used in breeding programs that want to include elite tropical germplasm adapted to temperate environments. Maturity classification is AES700-800. License agreements with ISURF are required for this variety prior to purchase.

BS29

BS29 is an adapted strain of Suwan-1, which was developed by Kasetsart University at Farm Suwan near Bangkok, Thailand. A sample of Suwan-1 [PI 439741-Suwan #1(S)C6] was obtained in 1986. Mass selection for earlier flowering was initiated in 1987. After six cycles of mass selection for adaptation, the population was designated as BS29. BS29 sheds pollen 9 days later than B73 × Mo17 and has 5.2% greater grain moisture at harvest. BS29 has excellent general combining ability with other adapted tropical varieties (BS16, BS27, and BS28). BS29 has good specific combining ability with BS10 and BSSS. BS29 has excellent grain quality; ears have flinty dark yellow kernels. BS29 is a strain of Suwan-1 adapted to temperate environments that should have potential in temperate breeding programs. Maturity classification is late AES800. License agreements with ISURF are required for this variety prior to purchase.

BS30

BS30 is a source of Iodent germplasm. Nineteen inbred lines that originated from the initial sampling of Iodent by M. T. Jenkins in 1922 were intermated to produce BS30. BS30 has a yellow, dent kernels on large girthed ears. Plant phenotypes are typically robust with large tassels, but plants generally have poor root and stalk strength. Maturity classification of BS30 is AES800. License agreements with ISURF are required for this variety prior to purchase.

BSAA(SRCB)C4

Iowa Synthetic AA, designated BSAA, was developed by recombining 58 North Central Corn Belt lines. Recurrent selection based upon S₁ line evaluation was used for 4 cycles to improve this synthetic for resistance to first-generation European corn borer and resistance to stalk rot. In all cycles, evaluations of S₁ lines were made in separate experiments under artificial infestations of the corn borer and artificial inoculations of Diplodia stalk rot. Whereas, the original BSAA was intermediate in resistance to both corn borer and stalk rot, BSAA(SRCB)C4 is resistant to both. Also, BSAA(SRCB)C4 is slightly earlier than BSAA for anthesis. License agreements with ISURF are required for this variety prior to purchase.

BSBB(SRCB)C4

Iowa Synthetic BB, designated BSBB, was developed by recombining 44 North Central Corn Belt inbred lines. At least 12 of these lines have germplasm from Iowa Stiff Stalk Synthetic. Recurrent selection based on S₁-line evaluation was used for 4 cycles to improve this synthetic for resistance to first-generation European corn borer and resistance to stalk rot. In all cycles, evaluations of S₁ lines were made in separate experiments by using artificial infestations of the corn borer and artificial inoculations of Diplodia stalk rot. It is slightly later than BSBB for anthesis. License agreements with ISURF are required for this variety prior to purchase.

BSCB1(R)C12

This improved breeding population was developed from 9 cycles of half-sib reciprocal recurrent selection, followed by 3 cycles of full-sib reciprocal recurrent selection. The tester population was BSSS(R)C11. BSCB1 was synthesized from 12 inbred lines: A340, CC5, Hy, I205, K230, L317, OhO7, Oh33, Oh4OB, Oh5IA, P8, and R4. Screening among and within S₁ lines for first-generation European corn borer, Ostrinia nubilalis (Hubner), resistance and stalk-rot resistance was done in selecting elite material for the testcross trials. License agreements with ISURF are required for this variety prior to purchase.

BSL(S)C7

This synthetic was developed from BSL(S)C4 with additional improvement for stalk quality. BSL(S)C4 was developed from the open-pollinated variety, Lancaster Surecrop, after 4 cycles of recurrent selection for stalk rot resistance. Three additional cycles of recurrent selection for resistance to mechanical breakage were used to obtain further improvement for stalk quality. BSL(S)C7 has better stalk-rot resistance than does BSL(S)C4, and it is much better than BSL(S)C4 for resistance to field stalk lodging. License agreements with ISURF are required for this variety prior to purchase.

BSSS(R)C12

This improved breeding population was developed from 9 cycles of half-sib reciprocal recurrent selection followed by 3 cycles of full-sib reciprocal recurrent selection with BSSS(R)C11 as tester. The tester population was BSCB1(R)C11. Screening among and within S₁ lines for European corn borer, Ostrinia nubilalis (Hubner), resistance and stalk-rot resistance was done in selecting elite material for the testcross yield trials. License agreements with ISURF are required for this variety prior to purchase.

BSTL(S)C5

Developed to provide a population containing some exotic germplasm. One-fourth of the germplasm of this synthetic was derived from the Mexican race, Tuxpeno; and the other $\frac{3}{4}$ was derived from the U.S. variety, Lancaster Surecrop. The population is an improved version of (Tuxpeno \times Lancaster²) Synthetic. Five cycles of S₂ recurrent selection for agronomic traits and yield have been completed; the population has improved grain yield and root and stalk quality relative to the original population. License agreements with ISURF are required for this variety prior to purchase.

POPCORN INBREDS

LINES AVAILABLE

Inbreds listed below are available from isolated increase fields. They are used to produce lopop 12 (DS91 × DS69) × DS28. Lines available are:

DS28 DS69 DS91

Orders for less than one MVK (MVK = 1,000 viable kernels) of any one line and orders without full payment cannot be accepted. Seed cost is \$5.00 per MVK. Minimum shipping charge on any order will be \$5.00 (five dollars) for the first MVK and \$0.50 for each additional MVK. Large orders may be sent freight collect.

BPM1

BPM1 is a mushrooming (round ball flake type) popcorn inbred line. It was selfed out of developmental material that eventually was released as BSP5C0. The yellow-kernel popcorn inbred line has red silk and yellow anthers. Under 1999 growing conditions near Ames, Iowa, it grew to a height of 60 inches with an ear height of 40 inches. It appears to be a few days earlier than HP72-11. BPM1 is dent sterile. Due to limited seed availability, orders will be limited to one 50-kernel packet per company. License agreements with ISURF are required for this variety prior to purchase.

BPM2

BPM2 is a yellow kernel popcorn inbred line. In 2002 it had a kernels per 10 gram count (k/10g) of 65 while HP72-11 had a k/10g of 94 and BPM1 had 59 k/10g. BPM2 plants have yellow anthers and red silks. The plants have a tendency to tiller. Its maturity is similar to BPM1, being just a few days earlier than HP72-11. It is dent sterile and presumed to carry Ga1.

In 2002 on a line per se basis, it rated 90% mushroom flakes while BPM1 rated only 75% mush. It appears that BPM2 can be a source for increasing the percentage of mushroom flakes in inbred crosses made to generate hybrids with a high percentage of mushroom flakes. License agreements with ISURF are required for this variety prior to purchase.

BP1

The following descriptions are based on data collected in 1991. BP1 is a yellow-kerneled popcorn inbred line with a kernel count per 10 grams of 101. It has green silk with red anthers. Under Ames, Iowa growing conditions in 1991 at approximately 25,000 plants per acre it averaged a plant height of 70 inches and an ear height of 25 inches with almost no tillers and one node with brace root development. It had an average of 1.5 ears per plant. Mid-pollen shed occurred 66 days after a May 11 planting date and mid-silk occurred 3 days later. It flowered near the same time as IDS53 and slightly before HP68-07. Ear length and width averaged 13.2 cm and 2.9 cm, respectively. Ears had 14 kernel rows. BP1 is dent sterile. Its plant type is somewhat unique and once seen is easily recognized. It has narrow, somewhat rolled, upright leaves.

BP1 is available as a royalty free general public release. License agreements with ISURF are required for this variety prior to purchase. Seed cost is \$50 / 100 kernels.

BP2

The following descriptions are based on data collected in 1991. BP2 is a yellow-kerneled popcorn inbred line with a kernel count per 10 grams of 70. It has red silk with orange anthers. Under Ames, Iowa growing conditions in 1991 at approximately 25,000 plants per acre it averaged a plant height of 80 inches and an ear height of 42 inches with no tillers and one node with brace root development. It had an average of two ears per plant. It is prolific and under optimum growing conditions can sometimes develop a third ear. Mid-pollen shed occurred 71 days after a May 11 planting date and mid-silk occurred 1 day later. BP2 flowered just after HP301 and IDS69 but before IDS28. Ear length and width averaged 13.4 cm and 3.0 cm, respectively. Ears had a kernel row number of 12. BP2 is dent sterile. Under Iowa growing conditions it has a vigorous plant type. If there is a weak part in the plant type of the inbred it is the roots. Under some growing conditions BP2 does not appear to have strong enough roots to support the vigorous plant growth.

BP2 is available as a royalty free general public release. License agreements with ISURF are required for this variety prior to purchase. Seed cost is \$50 / 100 kernels.

BP3

BP3 is a yellow kernel popcorn inbred line. In 2002 it had a kernels per 10 gram count (k/10g) of 73 while HP72-11 had a k/10g of 94. BP3 plants have purple anthers and green silks. Its maturity is about four to five days earlier than HP72-11. It is dent sterile and presumed to carry Ga1.

As an inbred line, in 2002 under microwave popping conditions, it popped 1,580 mL/30g while HP72-11 popped 1220 mL/30g. BP3 is one of the highest expansion public popcorn inbred lines released to date. This suggests that BP3 can provide a source for improved popping expansions in crosses.

POPCORN BREEDING POPULATIONS

For use as Genetic Stocks by Popcorn Breeders

LINES AVAILABLE

The following synthetic stocks are available at \$50 for 500 kernels, postage paid. A brief description of each line follows:

BSP7SAC0

BSP7SAC0 is more closely related to South American types than to Supergold or Amber Pearl types and represents the ISU popcorn breeding program's improved South American population. License agreements with ISURF are required for this variety prior to purchase. 500 k packets are available for \$50.00 each.

BSP8SGC0

BSP8SGC0 is more closely related to Supergold types than South American or Amber Pearl types and represents the ISU popcorn breeding program's improved Supergold population. Both yellow-kernel popcorn populations are variable for all traits and have improved popping expansions. Though not rigorously tested, the populations should be dent sterile. During development of these populations, selection was also made for tolerance to European corn borers.

License agreements with ISURF are required for this variety prior to purchase.

BSP4APC0

BSP4APC0 is a random mating yellow-kernel popcorn synthetic. It is a Yellow-Kernel popcorn population variable for all traits with a strong tendency to tiller.

The 154 open pollinated ears selected from 534 harvested ears to generate this released population had single-ear popping expansions that averaged 50.6 cc/g and ranged from 62.0 cc/g to 38.7 cc/g. Popcorn popping check hybrids lopop12 and Rob20-70 averaged 42.6 cc/g and 57.3 cc/g, respectively. License agreements with ISURF are required for this variety prior to purchase.

BSP5C0

BSP5C0 is a random mating yellow-kernel popcorn population. It is a yellow-kernel popcorn population variable for most traits. Most of the plants tend to be tiller free. At a very low frequency, some kernels will mutate to soft endosperm.

The 151 open-pollinated ears selected from 859 harvested ears had single ear popping expansions that averaged 54.2 cc/g and ranged from 64 cc/g to 35 cc/g. Popcorn popping hybrid checks lopop12 and Rob20-70 averaged 42.8 cc/g and 56.9 cc/g, respectively. License agreements with ISURF are required for this variety prior to purchase.

BSP1C₁

This is a genetically diverse, yellow-kernel population of adapted popcorn germplasm. It was developed by allowing many of the most popular and newest popcorn hybrids, both yellow and white, to random-mate via open pollination. During these two intermating generations – open pollination in isolation – mass selection was practiced for standability. After this, a recurrent selection program using S₁ lines for evaluation was initiated to improve the population. This released population is cycle 1 of that recurrent selection program.

In 1985, an evaluation of the population per se at two locations, one near Ames, Iowa, and one near Lafayette, Indiana, indicated respective stalk breakage percentages of 4% and 5%. This population was included in 2 popcorn hybrid yield tests where the respective overall stalk breakage percentage averages for the hybrids were 6.3% and 9.3%. Thus, this population can serve as a source of inbred lines with improved standability. Popping expansion for the population was 41.0 at both locations with the averages of the hybrids in the two experiments at 41.7 and 41.3, respectively. Also, an evaluation of the population per se in 1985 (2 reps) gave an average rating of 3.5 and 4.0 for first- and second-generation European corn borer resistance, respectively, on a scale of 1 to 9 with 1 being resistant and 9 being susceptible. Evidently, this population can serve as a source of some resistance to both generations of the European corn borer.

Initial checks indicate that, although the population is mostly dent sterile, it is not 100 percent dent sterile. License agreements with ISURF are required for this variety prior to purchase.

BSP1C4

BSP1C4 is an improved recurrent selection cycle 4 version of BSP1C1. BSP1C1 was released in 1986 and described in Crop Science, 1987, 27: 1318-1319. Through the additional three cycles of S1 recurrent selection, BSP1C4 has undergone selection for improved popping expansion, improved stalk quality, and increased tolerance to the second-generation of the European corn borer (ECB). It is a yellow-kernel popcorn population variable for plant height, kernel size and shape, flake type, and maturity. The 100 plants selected to generate the population had no broken stalks and 1994 single-ear popping expansion averaged 56 cc/g and ranged from 61 cc/g to 37 cc/g while the standard large popping check hybrid, Rob20-70, averaged 54 cc/g. BSP1C4 should be nearly 100% dent sterile. It seems to be most closely related to South American Types.

BSP1C4 is available as a royalty free general public release. License agreements with ISURF are required for this variety prior to purchase.

BSP2C₁

This is a somewhat narrow, genetically-based yellow population of adapted popcorn germplasm. It was developed to provide a source of large expansion inbred lines to cross to inbred lines coming out of dent corn x popcorn germplasm. Inbreds derived from dent x popcorn germplasm generally have improved stalk quality but have poorer popping expansion.

Four popcorn hybrids, A3004, 33122, P203, and 62180 were intermated in a diallel fashion. A3004 is a private hybrid from Ames Seed Farms, P203 is a released hybrid from Purdue, and 33122 and 62180 are non-released Purdue experimentals. A3004 and 33122 were chosen for their large popping expansion, 62180 for its excellent stalk strength, and P203 because its pedigree includes inbred lines found in the other hybrids.

In 1987, self-pollinated ears from the population were evaluated for popping expansion. These 285 ears averaged 1,254 mL/30g with a range of 600-1,580. Popping expansions for the hybrid checks were: Ipop 12 = 1,212, A3004 = 1,345, M140 = 1,394, and Rob 30-71 = 1,440. Of the 285 ears, 23 had popping expansions above 1,440. Also in 1987, European corn borer (ECB) data were collected on the performance of the population per se. The population per se averaged a rating of 2 for first-generation European corn borer resistance and a 4 for second-generation resistance on a scale of 1 to 9 where 1 is resistant and 9 is susceptible. It appears that along with large popping expansion, the population also carries fair resistance to both generations of the European corn borer.

Inbred lines developed from this population should be dent sterile. License agreements with ISURF are required for this variety prior to purchase.

BSP3C₁

BSP3C₁ is a yellow-kerneled popcorn synthetic that has dent corn germplasm in its background. The dent corn lines used were B86, B87, B68, and B84. The popcorn lines used were IDS69, IDS91, and KP47R, giving it a South American popcorn background. BSP3C₁ is mid-season maturity under Ames, Iowa, growing conditions. It has excellent agronomic traits. Dry microwave popped 30-gram expansions for the 250 ears bulked to form the synthetic ranged from 30 cc/g to 58 cc/g with an average of 49 cc/g. Hybrid checks A3004 and Rob20-70 averaged 47 cc/g and 50 cc/g, respectively. The population per se averaged a visual

rating of 6, and 6 for resistance to first- and second-generation of the European corn borer (ECB), respectively, where a rating of 1 is resistant and 9 is susceptible. It is dent sterile ($Ga1^s$ - $Ga1^s$) and has a kernel per 10 gram count of 62. License agreements with ISURF are required for this variety prior to purchase.

BSPWLC₁

This is a genetically diverse, white-kernel population of adapted popcorn germplasm. It was developed by allowing many of the most popular and newest popcorn hybrids, both yellow and white, to random-mate via open pollination. During these two intermating generations – open pollination in isolation – mass selection was practiced for standability. Then, white kernels were separated from yellow, and an S_1 recurrent selection program was initiated within the white material to improve the population. This released population is cycle 1 of that recurrent selection program.

A 1985 evaluation of the population per se at 2 locations, one near Ames, Iowa, and one near Lafayette, Indiana, for standability gave a mean of 7.5 percent for stalk lodging. This population was included in a 6-entry white hybrid yield test where the mean stalk lodging was 16.6 percent. Thus, this population could prove to be a source of improved standability for white popcorn. In the same test, this population had an average popping expansion of 39.9 with the overall mean of the test at 39.0, so it appears this population has an acceptable level of expansion.

An evaluation of the population per se in 1985 (2 reps) gave an average rating of 4 and 4 for first- and second-generation European corn borer (ECB), respectively, on a scale of 1 to 9 with 1 being resistant and 9 being susceptible. Evidently, this population can serve as a source of some resistance to both first- and second-generation European corn borer for white popcorn. Initial checks indicate that, although the population carries the gene for dent sterility, it is not 100 percent dent sterile. License agreements with ISURF are required for this variety prior to purchase.

BSPM1C₁

BSPM1C₁ is a fairly broad, genetic-based population of adapted yellow-kernel popcorn germplasm. It was developed to provide a source of popcorn germplasm that carries the tendency to pop a high percentage of “mushroom” or “ball” type flakes. The population has been through one cycle of S_1 recurrent selection for the ability to pop large mushroom flakes. During its development, it was crossed to dent sterile material such that the population should be cross sterile ($Ga1-S$ $Ga1-S$).

In 1989, sib-pollinations were made in the population to increase seed for release. On a rating scale of 1 to 3 where 1 is a high percentage of mushroom flakes and 3 is 100 percent butterfly flakes, 143 of 221 ears rated a 1. Of these 221 ears, only 7 produced 100 percent butterfly flakes. The 100 ears selected to generate the released population all rated a 1 with a popping expansion equal to or greater than our mushroom check hybrid A5011. The population per se under Ames, Iowa, growing conditions appears to be mid-season maturity with good agronomic traits and large kernel size. It popped 37.5 cc/g while our A5011 hybrid check popped 37.0 cc/g. License agreements with ISURF are required for this variety prior to purchase.

BSPM2C₁

BSPM2C₁, a yellow-kerneled popcorn synthetic that has dent corn germplasm in its background, is a mushrooming sub-population of BSP3C₁. BSPM2C₁ was developed to provide a heterotic partner population to BSPM1C₁ for producing inbred lines that combine to

produce mushroom hybrids. This synthetic is mid- to full-season maturity under Ames, Iowa, growing conditions. It has excellent agronomic traits. Oil popped 30-gram popping expansions for the 250 ears bulked to form the synthetic ranged from 17 cc/g to 39 cc/g with an average of 29 cc/g while mushrooming checks A5011 and BSPM1C₁ averaged 25 cc/g and 27 cc/g, respectively. It is dent-sterile (Gal^s-Gal^s) with relatively large kernel size (kernels/10 gram = 53). Because it still carries some dent kernel characteristics, lines from this population should be used as males when crossed to lines from BSPM1C₁ to develop mushroom hybrids. The population per se, evaluated in 1991, rated a 5 and 7 for resistance to the first- and second-generation European corn borer (ECB), respectively, where 1 is resistant and 9 is susceptible. The population cross, BSPM1C₁ × BSPM2C₁, rated a 5 and 6, respectively. License agreements with ISURF are required for this variety prior to purchase.

BHPXD-1C2

The BHPXD-1C2 population is Iowa State's version of Purdue University's HPXD-1 population after 2 cycles of recurrent selection for popping expansion. The original HPXD-1 has excellent stalk quality traits but only average popping expansion. In order to improve the expansion of this population, intense selection pressure for high expansion was applied throughout the 2 cycles of recurrent selection.

The decision to release this cycle of HPXD-1 was based on 2 factors. The first is that expansion improvements were made with no loss in standability. The second is the expansion data on individual ears from this population. In 1989, sib-pollinations were made in the population to increase seed. These individual sib-mated ears were popped and 18 out of 240 had expansions comparable to Rob30-71, our high expansion hybrid check. Also, to start the next cycle of recurrent selection, self-pollinations were made and 9 of these 226 ears had expansions comparable to Rob30-71. It appears that, even though the average expansion of cycle 2 was only 4 percent greater than the expansion of cycle 0, some relatively high expansion lines can be selected from cycle 2.

Except for a slight loss in yield, there appears to be only minor changes in agronomic traits between cycle 0 and cycle 2. License agreements with ISURF are required for this variety prior to purchase.

ORDER FORMS

ORDER BLANK FOR DENT CORN INBREDS

To: Committee for Agricultural Development
2023 Agronomy Hall
Ames, IA 50011-1050

I wish to purchase the following dent corn inbred lines:

DENT CORN INBRED LINE	QUANTITY (100 k Packets)	UNIT COST	TOTAL
1. B68		\$ 50.00	
2. B73		\$ 50.00	
3. B79		\$ 50.00	
4. B84		\$ 50.00	
5. B89		\$ 50.00	
6. B90		\$ 50.00	
7. B91		\$ 50.00	
8. B93		\$ 50.00	
9. B94		\$ 50.00	
10. B95		\$ 50.00	
11. B97		\$ 50.00	
12. B98		\$ 50.00	
13. B99		\$ 50.00	
14. B100		\$ 50.00	
15. B102		\$ 80.00	
16. B103		\$ 80.00	
17. B104		\$ 80.00	
18. B105		\$ 80.00	
19. B106		\$ 80.00	
20. B107		\$ 80.00	
21. B108		\$ 80.00	
22. B109		\$ 80.00	
23. B110		\$ 80.00	
24. B111		\$ 80.00	
25. B112		\$ 80.00	
26. B113		\$ 80.00	
27. B114		\$ 80.00	

DENT CORN INBRED LINE	QUANTITY (100 k Packets)	UNIT COST	TOTAL
28. B115		\$ 80.00	
29. B116		\$ 80.00	
30. B117		\$ 80.00	
31. B118		\$ 80.00	
32. B119		\$ 80.00	
33. B120		\$ 80.00	
34. B121		\$ 80.00	
35. B122		\$ 80.00	
36. B123		\$ 80.00	
37. B124		\$ 80.00	
38. B125		\$ 80.00	
39. IRF310		\$ 80.00	
40. IRF311		\$ 80.00	
41. IRF312		\$ 80.00	
42. IRF313		\$ 80.00	
43. IRF314		\$ 80.00	
44. IRF315		\$ 80.00	
45. IRF316		\$ 80.00	
46. IRF317		\$ 80.00	
47. IRF318		\$ 80.00	
48. IRF319		\$ 80.00	
49. IRF320		\$ 80.00	
50. IRF321		\$ 80.00	
51. LH38		\$ 50.00	
52. LH39		\$ 50.00	
53. LH104		\$ 50.00	
54. LH109		\$ 50.00	
55. IRF185		\$ 50.00	
56. IRF233		\$ 50.00	
57. IRF236		\$ 50.00	
58. IRF240		\$ 50.00	
59. IRF252		\$ 50.00	
60. IRF291		\$ 50.00	

Please find attached my check for \$_____ payable to the COMMITTEE FOR AGRICULTURAL DEVELOPMENT. Send seed to:

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Shipping Address (if different from above)

Address: _____

City: _____ State: _____ Zip Code: _____

I will pick up my seed <u>OR</u> Please ship my seed (Circle One)

ORDER BLANK FOR DENT CORN GENETIC STOCKS AND SYNTHETIC SEED STOCKS

To: Committee for Agricultural Development
 2023 Agronomy Hall
 Ames, IA 50011-1050

I wish to purchase the following dent corn genetic or synthetic seed stocks:

DENT CORN GENETIC STOCKS

The following lines are \$50 per unit of 100 kernels. Please indicate how many 100-kernel units are needed:

DENT CORN LINE	QUANTITY (100 k Packets)	UNIT COST	TOTAL
1. B52		\$ 50.00	
2. B75		\$ 50.00	
3. B85		\$ 50.00	
4. B86		\$ 50.00	
5. B87		\$ 50.00	
6. B88		\$ 50.00	
7. B92		\$ 50.00	
8. B96		\$ 50.00	

DENT CORN LINE	QUANTITY (100 k Packets)	UNIT COST	TOTAL
9. C.I. 31A		\$ 50.00	
10. B101		\$ 50.00	

SYNTHETIC SEED STOCKS

The following lines are available at \$80 per 500-kernel unit. Please indicate how many 500 k units are needed:

SYNTHETIC SEED STOCKS	QUANTITY (500 k Packets)	UNIT COST	TOTAL
1. BSCAD-1		\$ 80.00	
2. BSCAD-2		\$ 80.00	
3. BSCAD-3		\$ 80.00	
4. BSCAD-4		\$ 80.00	
5. BS11(5-S1)C5		\$ 80.00	
6. BS11(10-S1)C5		\$ 80.00	
7. BS11(S1)C5		\$ 80.00	
8. BS11(30-S1)C5		\$ 80.00	
9. BS11(S2)C5		\$ 80.00	
10. BS11(MER)C5		\$ 80.00	
11. BS11(HI)C5		\$ 80.00	
12. BS11(FS)C5		\$ 80.00	

ORDER BLANK FOR DENT CORN GENETIC STOCKS AND SYNTHETIC SEED STOCKS – CONTINUED

The following lines are available at \$50 per 500-kernel unit. Please indicate how many 500-kernel units are needed:

LINE	QUANTITY (500 k Packets)	UNIT COST	TOTAL	LINE	QUANTITY (500 k Packets)	UNIT COST	TOTAL
BS9(CB)C5		\$ 50.00		BS23		\$ 50.00	
BS10(FR)C10		\$ 50.00		BS26		\$ 50.00	
BS12(HI)C8		\$ 50.00		BS27		\$ 50.00	
BS13(S)C7		\$ 50.00		BS28		\$ 50.00	
BS16(CB)C4		\$ 50.00		BS29		\$ 50.00	
BS17(CB)C4		\$ 50.00		BS30		\$ 50.00	
BS18		\$ 50.00		BSAA(SRCB)C4		\$ 50.00	
BS19(S)C2		\$ 50.00		BSBB(SRCB)C4		\$ 50.00	
BS20(S)C2		\$ 50.00		BSCB1(R)C12		\$ 50.00	
BS21(R)C7		\$ 50.00		BSL(S)C7		\$ 50.00	
BS22(R)C7		\$ 50.00		BSSS(R)C12		\$ 50.00	
				BSTL(S)C5		\$ 50.00	

Please find attached my check for \$ _____ payable to the COMMITTEE FOR AGRICULTURAL DEVELOPMENT. Send seed to:

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Shipping Address (if different from above)

Address: _____

City: _____ State: _____ Zip Code: _____

I will pick up my seed	<u>OR</u>	Please ship my seed
(Circle One)		

ORDER BLANK FOR POPCORN INBREDS, SINGLE CROSS, AND POPULATIONS

To: Committee for Agricultural Development
 2023 Agronomy Hall
 Ames, IA 50011-1050

I wish to purchase the following popcorn inbreds, single cross, or populations:

POPCORN INBRED LINE	UNIT SIZE	QUANTITY REQUESTED	UNIT COST	SHIPPING CHARGES	TOTAL
1. DS28	1 MVK		\$ 5.00		
2. DS69	1 MVK		\$ 5.00		
3. DS91	1 MVK		\$ 5.00		

POPCORN INBRED LINE	UNIT SIZE	QUANTITY REQUESTED	UNIT COST	TOTAL
1. BPM1	50 k		\$ 25.00	
2. BPM2	100 k		\$ 50.00	
3. BP1	100 k		\$ 50.00	
4. BP2	100 k		\$ 50.00	
5. BP3	100 k		\$ 50.00	

POPCORN POPULATIONS	QUANTITY (500 k Packets)	UNIT COST	TOTAL
1. BSP1C ₁		\$ 50.00	
2. BSP1C ₄		\$ 50.00	
3. BSP2C ₁		\$ 50.00	
4. BSP3C ₁		\$ 50.00	
5. BSWLC ₁		\$ 50.00	
6. BSPM1C ₁		\$ 50.00	
7. BSPM2C ₁		\$ 50.00	
8. BHPXD-1C2		\$ 50.00	
9. BSP4APC0		\$ 50.00	
10. BSP5C0		\$ 50.00	
11. BSP7SAC0		\$ 50.00	
12. BSP8SGC0		\$ 50.00	

*ORDER BLANK FOR POPCORN INBREDS, SINGLE CROSS, AND POPULATIONS –
CONTINUED*

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Shipping Address (if different from above)

Address: _____

City: _____ State: _____ Zip Code: _____

I will pick up my seed OR Please ship my seed
(Circle One)

SAMPLE AGREEMENTS

SAMPLE CORN COMMERCIALIZATION AGREEMENT

CORN COMMERCIALIZATION AGREEMENT

THIS AGREEMENT is made and entered into this ____ day of _____, 200__, by and between the IOWA STATE UNIVERSITY RESEARCH FOUNDATION, INC. an Iowa non-profit corporation (hereinafter called "ISURF"), and _____ (hereinafter called "LICENSEE").

WITNESSETH:

WHEREAS, it is the mutual desire of ISURF and LICENSEE to promote the production, promotion, distribution, and sale of corn lines developed at Iowa State University:

WHEREAS, ISURF desires to grant to LICENSEE and LICENSEE desires to obtain a limited non-exclusive, non-transferable license to use one or more lines of Corn Foundation Seed Line(s) owned by ISURF or new line developed from ISU germplasm identified in Schedule A and offered to LICENSEE:

- (a) for the production of hybrid seed corn for sale and distribution.

WHEREAS the parties to this agreement further believe that this agreement is in the best interests of and will further the purpose of their two organizations, and that it will benefit agriculture.

Now, therefore, in consideration of the promises and mutual covenants contained herein, the parties agree as follows:

ARTICLE I – DEFINITIONS

For the purposes of this Agreement, the following terms shall be defined as follows:

- (a) "Corn Foundation Seed Line(s)" shall mean those inbred lines, identified in Schedule A (amendable from time to time with mutual consent) which have been bred or discovered at ISU and which ISURF desires to offer to LICENSEE. For purposes of this Agreement, Corn Foundation Seed Line shall include, but not be limited to, whole corn plants, seed, pollen, and other plant parts and/or tissues, and the genetic material contained therein.
- (b) "Improved or Recovered Inbred Lines" shall mean any line developed from Corn Foundation Seed Line(s) by selection or backcrossing.
- (c) "Hybrid Seed Corn" shall mean hybrid seed corn produced from at least one Corn Foundation Seed Line as defined in 1(a) above and/or hybrid seed corn produced from at least one New Corn Line as defined in paragraph 1(d) below.
- (d) "New Corn Line(s)" shall mean any Parent developed by LICENSEE and containing any Corn Foundation Seed Line or any part thereof.
- (e) "New Corn Hybrid(s)" shall mean Hybrid Seed Corn containing at least one New Corn Line(s) or any part thereof.

- (f) "Parent" shall mean any inbred and/or single cross line(s) which can be crossed to produce a hybrid.
- (g) "Territory" shall mean the United States of America.
- (h) "Term" shall mean the period specified in Section 5 of this Agreement.
- (i) "MVK" shall mean 1,000 viable kernels.

ARTICLE II – GRANT OF LICENSE

2.1 ISURF grants LICENSEE the non-exclusive right to use and sell the Corn Foundation Seed Line(s) under this agreement for the Term of the agreement. ISURF reserves the right to use and sell under this agreement and to distribute to third parties seed for breeding, research, and commercial purposes. Corn Foundation Seed Line(s) provided may be used only as specifically provided in this Agreement

2.2 LICENSEE agrees to pay ISURF a fee in the amount published in the current ISURF / Committee for Agricultural Development (CAD) seed price list for each unit requested for the Corn Foundation Seed Line(s).

2.3 LICENSEE shall not transfer or distribute Corn Foundation Seed Line(s) to any third party not bound by contract to LICENSEE unless the third party is also a licensee of the Corn Foundation Seed Line(s). LICENSEE shall not grant sublicenses of Corn Foundation Seed Line(s).

2.4 Seeds, plants, plant parts, seed parts, callus tissue or DNA of these Corn Foundation Seed Line(s) will not be distributed to a third party without the written consent of ISURF.

2.5 LICENSEE may cross the Corn Foundation Seed Line(s) for the production of Hybrid Seed Corn for sale and distribution.

2.6 Corn Foundation Seed Line(s) may not be increased by LICENSEE except as specifically provided in Article 4 of this agreement.

2.7 LICENSEE may backcross a Corn Foundation Seed Line(s) as the recurrent parent for research purposes and for development of Improved or Recovered Inbred lines.

2.8 New Corn Lines and Improved or Recovered inbred lines may be increased by LICENSEE for research purposes and the production of Hybrid Seed for sale and distribution only as provided in Article 4 of this agreement.

2.9 LICENSEE may subject a Corn Foundation Seed Line(s) to genetic manipulation under this Agreement only provided LICENSEE obtains written permission from ISURF prior to all such activities. The identity of any genetically modified line must carry unique identification as mutually agreed upon by ISURF and LICENSEE.

2.10 LICENSEE agrees that the Corn Foundation Seed Line(s) is the property of ISURF. LICENSEE shall have no rights with respect thereto except as may be expressly granted hereunder. LICENSEE shall not apply for any patent or other right and shall not divulge or disclose any information, material or documents, concerning this agreement or the rights contained hereunder or make available in any way or use the aforesaid Corn Foundation Seed Line(s), except as expressly provided in this agreement, without the prior written consent of ISURF. ISURF will have the right to pursue legal protection of the Corn Foundation Seed Line(s), the rights of which will be owned by ISURF.

2.11 ISURF or its designated agents will maintain breeder seed of the Corn Foundation Seed Line(s).

2.12 LICENSEE agrees to submit annual reports detailing commercialization progress and to pay ISURF a royalty as determined in Article IV.

2.13 Should LICENSEE decide not to pursue commercialization of the Corn Foundation Seed Line(s), its entire supply of Corn Foundation Seed shall be disposed of as directed by ISURF.

ARTICLE III – DUE DILIGENCE

3.1 LICENSEE shall use its best efforts to bring the licensed Corn Foundation Seed Line(s) to market through a thorough, vigorous and diligent program.

ARTICLE IV – ROYALTIES

4.1 Corn Foundation Seed Line(s): LICENSEE will pay to ISURF through its office at 310 Lab of Mechanics, Iowa State University, Ames, Iowa 50011, royalties in the amount stated on Schedule A per MVK of the Corn Foundation Seed Line(s) planted for commercial Hybrid Seed Corn production. Royalties will be due and payable annually on the September 1 following the previous July 1 – June 30 fiscal year during which Corn Foundation Seed Line(s) is planted for the production of commercial Hybrid Seed Corn. For example, for Corn Foundation Seed Line(s) planted during the period from July 1, 2003 to June 30, 2004, payment will be due September 1, 2004. Upon request by ISURF, its auditor, or its designated representative, LICENSEE shall make available sufficient records to verify the amount of Corn Foundation Seed used for planting.

4.2 New Corn Lines or Improved or Recovered Inbred Lines: Royalties on New Corn Lines or Improved or Recovered Inbred Lines shall be proportional to the theoretical average number of alleles in the Improved or Recovered Inbred lines according to the pedigree times the price listed on Schedule A for each MVK of the Improved or Recovered Line planted for commercial Hybrid Seed Corn production. For example, where B is the Foundation Seed line and Y is a line not covered under this agreement, the inbred created from the cross B × Y will be calculated as 50% × Schedule A rate. Royalties will not be collected on crosses that contain less than 50% the theoretical average number of alleles. Royalties on Improved or Recovered Inbred Lines will be due and payable annually on September 1 as specified in Article 4.1.

4.3 LICENSEE shall keep full, true and accurate books of account containing all particulars that may be necessary for the purpose of showing the amounts payable to ISURF hereunder. Said books of account shall be kept at LICENSEE's principal place of business or the principal place of business of the appropriate division of LICENSEE to which this Agreement relates. Said books and the supporting data shall be open at all reasonable times for ten (10) years following the end of the calendar year to which they pertain, to the inspection of ISURF or its agents for the purpose of verifying LICENSEE's royalty statement or compliance in other respects with this Agreement.

4.4 LICENSEE shall maintain control of all seed production grown under this Agreement.

4.5 LICENSEE may market and distribute New Corn Hybrids, or Hybrid Seed Corn produced in accordance with this Agreement under their own brand name provided, however, that Corn Foundation Seed Line(s) sold or distributed to other Licensees is identified by the Corn Foundation Seed Line(s) name.

ARTICLE V - TERMINATION

5.1 LICENSEE shall have the right to cancel or terminate this agreement at any time after six months written notice to ISURF, provided, however, that such termination shall not impair any accrued rights of ISURF or relieve LICENSEE from any other obligation of LICENSEE arising upon such termination.

5.2 If LICENSEE should fail to exercise the diligence required in Article III hereof, or to deliver to ISURF any agreement, payment, statement, report or other document required to be delivered at the time or times that the same shall be made, or shall use the licensed invention or licensed material for purposes not herein expressly authorized or if LICENSEE shall violate or fail to keep or perform any obligation, term or condition of this agreement on its part to be kept or performed hereunder, then and in such event ISURF may give written notice of such breach or default to LICENSEE, specifying the default which is claimed and if LICENSEE should fail to repair such breach or default in sixty (60) days from receipt by it of such notice, ISURF shall have the right to cancel or terminate agreement by written notice to LICENSEE. Upon delivery of such notice of cancellation or termination to LICENSEE, this agreement shall be terminated but termination shall not impair any accrued rights of ISURF or relieve LICENSEE from any obligation of LICENSEE arising upon termination.

5.3 It is further agreed that should LICENSEE be adjudged bankrupt, become insolvent or enter into or make a composition with or assignment to its creditors, then and in such event, this license shall automatically terminate without notice but such termination shall not impair any accrued rights of ISURF or relieve LICENSEE from any other obligation of LICENSEE arising upon such termination, and all seeds of the Corn Foundation Seed Line(s) covered under this agreement are to be disposed of as directed by ISURF.

5.4 This Agreement shall remain in effect until ten years after date of the agreement, unless sooner terminated by either party upon six months written notice of intent to terminate. In the event this agreement is terminated by either party for any reason, LICENSEE will dispose of all licensed Corn Foundation Seed Line(s) as directed by ISURF. All provisions of this Agreement regarding sales and royalties on seed produced pursuant to this Agreement shall continue to apply for a period of ten (10) years after the effective cancellation date as if this Agreement were still in force. This Agreement may be extended in its present form, or any modified form, by written request of either party for a period of ten years.

ARTICLE VI – NON-USE OF NAMES

6.1 Neither ISURF, nor LICENSEE or any of its growers shall use the name of either party to this Agreement in any advertising or publicity relating to the Corn Foundation Seed Line(s) without prior written permission of that party.

6.2 ISURF retains the right to disclose to the public the transfer of this technology and the existence of this license with the LICENSEE.

ARTICLE VII – INFRINGEMENT

7.1 In the event that LICENSEE shall learn of infringement of the Corn Foundation Seed Line(s), or wrongful use of the Corn Foundation Seed Line(s), LICENSEE shall notify ISURF in writing to such effect and provide ISURF with evidence thereof in LICENSEE's possession. ISURF shall use its best efforts to terminate the infringement or wrongful use without litigation. If such efforts are not successful, ISURF, in its discretion, may cause suit to be brought for infringement or other wrongful use. If requested by ISURF, LICENSEE agrees to cooperate with ISURF in any infringement or other proceeding that ISURF may institute.

ARTICLE VIII – WARRANT

8.1 ISURF does not warrant the validity or scope of any legal protection that become licensed under this agreement.

8.2 ISURF makes no warranty, expressed or implied, that the Corn Foundation Seed Line(s) will be successful for the commercial production of corn seed.

ARTICLE IX – WARRANTIES & INDEMNIFICATION

9.1 ISURF makes no representations, warranties or conditions other than those expressed in this clause. The liability of ISURF with respect to any misdescription of or deviation from the characteristics of such Corn Foundation Seed Line(s) with respect to any misrepresentation or breach of condition or warranty, expressed or implied, is limited to refunding the purchase price of the seed sold.

9.2 LICENSEE agrees that it will indemnify and hold harmless ISURF, its trustees, officers, employer, affiliates, from any suits, costs or charges as a result of the manufacture, use or sale by LICENSEE of the Corn Foundation Seed Line(s).

9.3 LICENSEE shall obtain and carry in full force and effect liability insurance which shall protect LICENSEE and ISURF in regard to events covered by 9.2 above.

ARTICLE X – WAIVER

10.1 This agreement may be modified at any time by mutual consent of both parties. Such modifications shall be in writing, signed by both parties, and made a part of this agreement.

10.2 It is agreed that no waiver by either party hereto of any breach or default of any of the covenants or requirements herein set forth shall be deemed a waiver as to any subsequent or similar breach or default.

10.3 This agreement terminates all prior arrangements written or oral and incorporates the entire agreement of the parties. It shall be modified only in writing, signed by both parties. This agreement is made in the state of Iowa and shall be governed by and construed in accordance with its laws.

10.4 Any notices or reports required to be sent to either party to this agreement shall be deemed received when sent by certified first-class mail, postage prepaid, to the attention of the party as set forth below:

To: Iowa State University Research Foundation, Inc.
310 Lab of Mechanics
Ames, IA 50011-2131

To: LICENSEE: _____

Attn: _____

10 .5 If one or more of the provisions of this agreement shall be held to be invalid, illegal or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby.

IN WITNESS WHEREOF, the parties hereto have caused this agreement to be executed by their respective proper officers.

For Iowa State University
Research Foundation, Inc.

For COMPANY

(signature of Authorized Official)

(signature of Authorized Official)

Dr. Kenneth Kirkland

(print or type name)

(print or type name)

Executive Director

(title)

(title)

(date)

(date)

(fax)

Schedule A

LINE

ROYALTY PER MVK PLANTED

\$ 3.00

SAMPLE INBRED CORN RESEARCH AND DEVELOPMENT AGREEMENT

Whereas, COMPANY has requested a sample of the following proprietary inbred corn germplasm which is jointly owned by ISURF and USDA / ARS.

Corn Germplasm Inbred Line

ISURF agrees to supply seed of the above inbred lines and COMPANY agrees to abide by the following terms of the AGREEMENT:

1. Seed provided may be used for producing test crosses, evaluation, developing breeding populations for extraction of inbred lines, or they may be used directly in hybrids.
2. Seed may be increased but only to provide enough additional seed to make experimental hybrids for evaluation or to develop new breeding populations.
3. No seeds, plants, plant parts, seed parts, callous tissue or DNA of these inbred lines will be distributed to a third party.
4. An annual report indicating use of the above lines is required and due annually on September 1 until this agreement is terminated. A template for the report is attached.
5. Any line or population derived from this germplasm must be commercially licensed prior to release or distribution. Royalties will be collected on all commercialized lines or populations containing 50% (fifty percent) or more licensed ISU germplasm by pedigree. Lines or populations containing less than 50% (fifty percent) ISU germplasm will also require a commercialization agreement but will be royalty free.
6. Use of these inbred lines to produce hybrids for commercialization should not start before COMPANY requests a commercialization license from ISURF and COMPANY signs a commercialization licensing agreement.

COMPANY may conduct and publish results of research on this germplasm and/or genetic stocks, cultivars, hybrids and/or germplasm developed with the germplasm listed above without prior approval of ISURF. COMPANY agrees to duly acknowledge the contributions of the Iowa State University and USDA / ARS breeding programs in the provision of the germplasm in all publications and in all descriptions and release notifications of material derived from the germplasm listed above.

COMPANY agrees that ISURF and USDA / ARS are not liable for any royalty claims that may be made against the parentage of the inbred lines listed above. This agreement shall be construed according to the laws of the State of Iowa.

The germplasm is provided "As Is" without warranty of any sort, expressed or implied. The recipient agrees to bear all risk resulting from the use of the germplasm and anything derived therefrom.

In Witness whereof, the parties have executed this Agreement the day and year first written above.

(signature of Authorized Official)

(print or type name)

(title)

(date)

(signature of Authorized Official)

(print or type name)

(title)

(date)

(address)

SAMPLE INBRED CORN RESEARCH AND TESTING AGREEMENT

INBRED CORN RESEARCH AND TESTING AGREEMENT

This AGREEMENT made by and between the Iowa State University Research Foundation, Inc. (hereinafter called ISURF), and _____ (hereinafter called COMPANYY).

Whereas, COMPANYY has requested a sample of the following proprietary inbred corn germplasm which is jointly owned by ISURF and USDA / ARS.

Corn Germplasm Inbred Line

ISURF agrees to supply seed of the above inbred lines and COMPANYY agrees to abide by the following terms of the AGREEMENT:

1. Seed provided may be used for field testing, evaluation and/or test crossing only.
2. Seed may be increased but only to provide enough additional seed to make experimental hybrids for evaluation.
3. No seeds, plants, plant parts, seed parts, callous tissue or DNA of these inbred lines will be distributed to a third party.
4. Use of these inbred lines to produce hybrids for commercialization should not start before COMPANYY requests a commercialization license from ISURF and COMPANYY signs a commercialization licensing agreement.

COMPANYY may conduct and publish results of research on this germplasm and/or genetic stocks, cultivars, hybrids and/or germplasm developed with the germplasm listed above without prior approval of ISURF. COMPANYY agrees to duly acknowledge the contributions of the Iowa State University and USDA / ARS breeding programs in the provision of the germplasm in all publications and in all descriptions and release notifications of material derived from the germplasm listed above.

COMPANYY agrees that ISURF and USDA / ARS are not liable for any royalty claims that may be made against the parentage of the inbred lines listed above. This agreement shall be construed according to the laws of the State of Iowa.

The germplasm is provided "As Is" without warranty of any sort, expressed or implied. The recipient agrees to bear all risk resulting from the use of the germplasm and anything derived therefrom.

In Witness whereof, the parties have executed this Agreement the day and year first written above.

For Iowa State University
Research Foundation, Inc.

For COMPANYY

(signature of Authorized Official)

(signature of Authorized Official)

Dr. Kenneth Kirkland

(print or type name)

(print or type name)

Executive Director

(title)

(title)

(date)

(date)

(address)

(fax)

SAMPLE CORN POPULATION RESEARCH AND DEVELOPMENT AGREEMENT

MAIZE POPULATION RESEARCH AND DEVELOPMENT AGREEMENT

This AGREEMENT made _____ by and between the Iowa State University Research Foundation, Inc. (hereinafter called ISURF), and _____ (hereinafter called COMPANY).

Whereas, COMPANY has requested a sample of the following proprietary maize population(s) which is owned by ISURF.

Maize Population

ISURF agrees to supply seed of the above maize population(s) and COMPANY agrees to abide by the following terms of the AGREEMENT:

1. Seed provided may be used for basic research, evaluation and/or test crossing only. Seed may be increased but only to provide enough additional seed for research and evaluation.
2. No seeds, plants, plant parts, seed parts, callous tissue or DNA of these populations will be distributed to a third party.
3. Direct use of these populations for commercialization should not start before COMPANY requests a commercialization license from ISURF and COMPANY signs a commercialization licensing agreement.

COMPANY may conduct and publish results of research on this germplasm and/or genetic stocks, cultivars, hybrids and/or germplasm developed with the germplasm listed above without prior approval of ISURF. COMPANY agrees to duly acknowledge the contributions of the Iowa State University breeding program in the provision of the germplasm in all publications and in all descriptions and release notifications of material derived from the germplasm listed above.

COMPANY agrees that ISURF is not liable for any royalty claims that may be made against the parentage of the populations listed above. This agreement shall be construed according to the laws of the State of Iowa.

The germplasm is provided "As Is" without warranty of any sort, expressed or implied. The recipient agrees to bear all risk resulting from the use of the germplasm and anything derived therefrom.

In Witness whereof, the parties have executed this Agreement the day and year first written above.

For Iowa State University
Research Foundation, Inc.

(signature of Authorized Official)

Dr. Kenneth Kirkland

(print or type name)

Executive Director

(title)

(date)

For COMPANY

(signature of Authorized Official)

(print or type name)

(title)

(date)

(address)

(fax)

SAMPLE CORN POPULATION COMMERCIALIZATION AGREEMENT

CORN POPULATION COMMERCIALIZATION AGREEMENT

THIS AGREEMENT is made and entered into this ____ day of _____ 200__, by and between the IOWA STATE UNIVERSITY RESEARCH FOUNDATION, INC. an Iowa non-profit corporation (hereinafter called "ISURF"), and _____ (hereinafter called "LICENSEE").

WITNESSETH:

WHEREAS, it is the mutual desire of ISURF and LICENSEE to promote the production, promotion, distribution, and sale of corn genetics owned by ISURF:

WHEREAS, ISURF desires to grant to LICENSEE and LICENSEE desires to obtain a limited non-exclusive, non-transferable license to use one or more Corn Seed Population(s) owned by ISURF identified in Schedule A and offered to LICENSEE:

- (a) for research and the development of new corn lines, and
- (b) for the production of hybrid seed corn for sale and distribution.

WHEREAS the parties to this agreement further believe that this agreement is in the best interests of and will further the purpose of their two organizations, and that it will benefit agriculture.

Now, therefore, in consideration of the promises and mutual covenants contained herein, the parties agree as follows:

ARTICLE I – DEFINITIONS

For the purposes of this Agreement, the following terms shall be defined as follows:

- (a) "Corn Seed Population(s)" shall mean those corn populations, identified in Schedule A which have been developed at ISU or owned by ISURF and which ISURF desires to offer to LICENSEE. For purposes of this Agreement, Corn Seed Population(s) shall include, but not be limited to, whole corn plants, seed, pollen, and other plant parts and/or tissues, and the genetic material contained therein.
- (b) "Improved or Recovered Inbred Lines" shall mean any line developed from Corn Seed Population(s) by selection or backcrossing.
- (c) "Hybrid Seed Corn" shall mean hybrid seed corn produced from at least one Improved or Recovered Inbred Line 1(b) above and/or hybrid seed corn produced from at least one New Corn Line as defined in paragraph 1(d) below.
- (d) "New Corn Line(s)" shall mean any Parent developed by LICENSEE and containing any Corn Seed Population or any part thereof.
- (e) "New Corn Hybrid(s)" shall mean Hybrid Seed Corn containing at least one New Corn Line(s) or any part thereof.
- (f) "Parent" shall mean any inbred and/or single cross line(s) which can be crossed to produce a hybrid.

(g) "Territory" shall mean the United States of America.

(h) "Term" shall mean the period specified in Section 5 of this Agreement.

(i) "MVK" shall mean 1,000 viable kernels

ARTICLE II – GRANT OF LICENSE

2.1 ISURF grants LICENSEE the non-exclusive right to use and sell the Corn Seed Population(s) under this agreement for the Term of the agreement. ISURF reserves the right to use and sell under this agreement and to distribute to third parties seed for breeding, research, and commercial purposes. Corn Seed Population(s) provided may be used only as specifically provided in this Agreement.

2.2 LICENSEE agrees to pay ISURF a fee in the amount published in the current ISURF / Committee for Agricultural Development (CAD) seed price list for each unit requested for the Corn Foundation Seed Line(s).

2.3 LICENSEE shall not transfer or distribute Corn Foundation Seed Line(s) to any third party not bound by contract to LICENSEE unless the third party is also a licensee of the Corn Seed Population(s). LICENSEE shall not grant sublicenses of Corn Seed Population(s).

2.4 Seeds, plants, plant parts, seed parts, callus tissue or DNA of these Corn Seed Population(s) will not be distributed to a third party without the written consent of ISURF.

2.5 LICENSEE may cross the Corn Seed Population(s) for the production of Hybrid Seed Corn for sale and distribution.

2.6 LICENSEE may backcross a Corn Seed Population(s) as the recurrent parent for research purposes and for development of Improved or Recovered Inbred lines.

2.7 New Corn Lines and Improved or Recovered inbred lines may be increased by LICENSEE for research purposes and the production of Hybrid Seed for sale and distribution only as provided in Article 4 of this agreement.

2.8 LICENSEE may subject a Corn Seed Population(s) to genetic manipulation under this Agreement only provided LICENSEE obtains written permission from ISURF prior to all such activities. The identity of any genetically modified line must carry unique identification as mutually agreed upon by ISURF and LICENSEE.

2.9 LICENSEE agrees that the Corn Seed Population(s) is the property of ISURF. LICENSEE shall have no rights with respect thereto except as may be expressly granted hereunder. LICENSEE shall not apply for any patent or other right and shall not divulge or disclose any information, material or documents, concerning this agreement or the rights contained hereunder or make available in any way or use the aforesaid Corn Seed Population(s), except as expressly provided in this agreement, without the prior written consent of ISURF.

2.10 LICENSEE agrees to pay ISURF a royalty as determined in Article IV.

2.11 Should LICENSEE decide not to pursue commercialization of the Corn Seed Population(s), its entire supply of Corn Seed Population(s) shall be disposed of as directed by ISURF.

ARTICLE III – DUE DILIGENCE

3.1 LICENSEE shall use its best efforts to bring the licensed Corn Seed Population(s) to market through a thorough, vigorous and diligent program.

ARTICLE IV – FEES

4.1 Corn Foundation Seed Line(s): LICENSEE will pay to ISURF through its office at 310 Lab of Mechanics, Iowa State University, Ames, Iowa 50011, licensing fees in the amount of \$1,000 per Corn Seed Population(s) listed on Schedule A. Licensing Fees will be due and payable upon execution of this agreement.

4.2 LICENSEE shall maintain control of all seed production grown under this Agreement.

4.3 LICENSEE may market and distribute New Corn Hybrids, or Hybrid Seed Corn produced in accordance with this Agreement under their own brand name provided, however, that Corn Seed Population(s) sold or distributed to other Licensees is identified by the Corn Seed Population(s) name.

ARTICLE V – TERMINATION

5.1 LICENSEE shall have the right to cancel or terminate this agreement at any time after six months written notice to ISURF, provided, however, that such termination shall not impair any accrued rights of ISURF or relieve LICENSEE from any other obligation of LICENSEE arising upon such termination.

5.2 If LICENSEE should fail to exercise the diligence required in Article III hereof, or to deliver to ISURF any agreement, payment, statement, report or other document required to be delivered at the time or times that the same shall be made, or shall use the Corn Seed Population(s) for purposes not herein expressly authorized or if LICENSEE shall violate or fail to keep or perform any obligation, term or condition of this agreement on its part to be kept or performed hereunder, then and in such event ISURF may give written notice of such breach or default to LICENSEE, specifying the default which is claimed and if LICENSEE should fail to repair such breach or default in sixty (60) days from receipt by it of such notice, ISURF shall have the right to cancel or terminate agreement by written notice to LICENSEE. Upon delivery of such notice of cancellation or termination to LICENSEE, this agreement shall be terminated but termination shall not impair any accrued rights of ISURF or relieve LICENSEE from any obligation of LICENSEE arising upon termination.

5.3 It is further agreed that should LICENSEE be adjudged bankrupt, become insolvent or enter into or make a composition with or assignment to its creditors, then and in such event, this license shall automatically terminate without notice but such termination shall not impair any accrued rights of ISURF or relieve LICENSEE from any other obligation of LICENSEE arising upon such termination, and all seeds of the Corn Foundation Seed Line(s) covered under this agreement are to be disposed of as directed by ISURF.

5.4 This Agreement shall remain in effect until ten years after date of the agreement, unless sooner terminated by either party upon six months written notice of intent to terminate. In the event this agreement is terminated by either party for any reason, LICENSEE will dispose of all licensed Corn Seed Population(s) as directed by ISURF. All provisions of this Agreement regarding sales and royalties on seed produced pursuant to this Agreement shall continue to apply for a period of ten (10) years after the effective cancellation date as if this Agreement were still in force. This Agreement may be extended in its present form, or any modified form, by written request of either party for a period of ten years.

ARTICLE VI – NON-USE OF NAMES

6.1 Neither ISURF, nor LICENSEE or any of its growers shall use the name of either party to this Agreement in any advertising or publicity relating to the Corn Seed Population(s) without prior written permission of that party.

6.2 ISURF retains the right to disclose to the public the transfer of this technology and the existence of this license with the LICENSEE.

ARTICLE VII – INFRINGEMENT

7.1 In the event that LICENSEE shall learn of infringement of the Corn Seed Population(s), or wrongful use of the Corn Seed Population(s), LICENSEE shall notify ISURF in writing to such effect and provide ISURF with evidence thereof in LICENSEE's possession. ISURF shall use its best efforts to terminate the infringement or wrongful use without litigation. If such efforts are not successful, ISURF, in its discretion, may cause suit to be brought for infringement or other wrongful use. If requested by ISURF, LICENSEE agrees to cooperate with ISURF in any infringement or other proceeding that ISURF may institute.

ARTICLE VIII – WARRANT

8.1 ISURF does not warrant the validity or scope of any legal protection that become licensed under this agreement.

8.2 ISURF makes no warranty, expressed or implied, that the Corn Seed Population(s) will be successful for the commercial production of corn seed.

ARTICLE IX – WARRANTIES & INDEMNIFICATION

9.1 ISURF makes no representations, warranties or conditions other than those expressed in this clause. The liability of ISURF with respect to any misdescription of or deviation from the characteristics of such Corn Seed Population(s) with respect to any misrepresentation or breach of condition or warranty, expressed or implied, is limited to refunding the purchase price of the seed sold.

9.2 LICENSEE agrees that it will indemnify and hold harmless ISURF, its trustees, officers, employer, affiliates, from any suits, costs or charges as a result of the manufacture, use or sale by LICENSEE of the Corn Foundation Seed Line(s).

9.3 LICENSEE shall obtain and carry in full force and effect liability insurance which shall protect LICENSEE and ISURF in regard to events covered by 9.2 above.

ARTICLE X – WAIVER

10.1 This agreement may be modified at any time by mutual consent of both parties. Such modifications shall be in writing, signed by both parties, and made a part of this agreement.

10.2 It is agreed that no waiver by either party hereto of any breach or default of any of the covenants or requirements herein set forth shall be deemed a waiver as to any subsequent or similar breach or default.

10.3 This agreement terminates all prior arrangements written or oral and incorporates the entire agreement of the parties. It shall be modified only in writing, signed by both parties. This

agreement is made in the state of Iowa and shall be governed by and construed in accordance with its laws.

10.4 Any notices or reports required to be sent to either party to this agreement shall be deemed received when sent by certified first-class mail, postage prepaid, to the attention of the party as set forth below:

To: Iowa State University Research Foundation, Inc.
310 Lab of Mechanics
Ames, IA 50011-2131

To: LICENSEE: _____

Attn: _____

10.5 If one or more of the provisions of this agreement shall be held to be invalid, illegal or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby.

IN WITNESS WHEREOF, the parties hereto have caused this agreement to be executed by their respective proper officers.

For Iowa State University
Research Foundation, Inc.

For COMPANY

(signature of Authorized Official)

(signature of Authorized Official)

Dr. Kenneth Kirkland

(print or type name)

(print or type name)

Executive Director

(title)

(title)

(date)

(date)

(fax)

Schedule A

CORN SEED POPULATION(S)

ROYALTY PER MVK PLANTED

\$ 3.00

SAMPLE INBRED POPCORN RESEARCH AND DEVELOPMENT AGREEMENT

INBRED POPCORN RESEARCH AND DEVELOPMENT AGREEMENT

This AGREEMENT made this ___ day of _____, 200__ by and between the Iowa State University Research Foundation, Inc. (hereinafter called ISURF), and _____ (hereinafter called COMPANYY).

Whereas, COMPANYY has requested a sample of the following proprietary inbred popcorn germplasm which is the exclusive property of ISURF.

Popcorn Germplasm Inbred Lines

ISURF agrees to supply seed of the above inbred lines and COMPANYY agrees to abide by the following terms of the AGREEMENT:

1. Seed provided may be used for basic research, evaluation and/or test crossing only. Seed may be increased but only to provide enough additional seed to make experimental hybrids for evaluation.
2. No seeds, plants, plant parts, seed parts, callous tissue or DNA of these inbred lines will be distributed to a third party.
3. Direct commercialization of these inbred lines should not start before COMPANYY requests a commercialization license from ISURF and COMPANYY signs a commercialization licensing agreement.

COMPANYY may conduct and publish results of research on this germplasm and/or genetic stocks, cultivars, hybrids and/or germplasm developed with the germplasm listed above without prior approval of ISURF. COMPANYY agrees to duly acknowledge the contributions of the Iowa State University breeding program in the provision of the germplasm in all publications and in all descriptions and release notifications of material derived from the germplasm listed above.

COMPANYY agrees that ISURF is not liable for any royalty claims that may be made against the parentage of the inbred lines listed above. This agreement shall be construed according to the laws of the State of Iowa.

The germplasm is provided "As Is" without warranty of any sort, expressed or implied. The recipient agrees to bear all risk resulting from the use of the germplasm and anything derived therefrom.

In Witness whereof, the parties have executed this Agreement the day and year first written above.

For Iowa State University
Research Foundation, Inc.

For COMPANYY

(signature of Authorized Official)

(signature of Authorized Official)

Dr. Kenneth Kirkland

(print or type name)

(print or type name)

Executive Director

(title)

(title)

(date)

(date)

(fax)

POPCORN RESEARCH AND EXPERIMENTAL HYBRID DEVELOPMENT AGREEMENT

This AGREEMENT made this ____day of _____, 200__ by and between the Iowa State University Research Foundation, Inc. (hereinafter called ISURF), and _____ (hereinafter called COMPANY).

Whereas, COMPANY has requested a sample of the following proprietary POPCORN germplasm which is the exclusive property of ISURF.

Popcorn Germplasm Breeding Population

ISURF agrees that it will not charge COMPANY any royalty or other financial remuneration for germplasm or other genetic material developed by COMPANY in accordance with the terms of this Agreement using the germplasm listed above. COMPANY may conduct and publish results of research on this germplasm and/or genetic stocks, cultivars, hybrids and/or germplasm developed with the germplasm listed above without prior approval of ISURF. COMPANY agrees to duly acknowledge the contributions of the Iowa State University breeding program in the provision of the germplasm in all publications and in all descriptions and release notifications of material derived from the germplasm listed above.

COMPANY agrees that ISURF is not liable for any royalty claims that may be made against the parentage of the inbred lines listed above. This agreement shall be construed according to the laws of the State of Iowa.

The germplasm is provided "As Is" without warranty of any sort, expressed or implied. The recipient agrees to bear all risk resulting from the use of the germplasm and anything derived therefrom.

In Witness whereof, the parties have executed this Agreement the day and year first written above.

For Iowa State University
Research Foundation, Inc.

For COMPANY

(signature of Authorized Official)

(signature of Authorized Official)

Dr. Kenneth Kirkland

(print or type name)

(print or type name)

Executive Director

(title)

(title)

(date)

(date)

(fax)