No. 9100184

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

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

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

SOYBEAN

'9593'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D.C. *this* 30th *day of* September *in the year of our Lord one thousand nine hundred and* ninety-two.

Attest:

Kenneth A. Evans

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Edward Madigan

Secretary of Agriculture

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Clearance Office, OIRM, Room 404-W, Washington, D.C. 20250; and to the Office of Management and Budget, Paperwork Reduction Project (OMB #0581-0055), Washington, 20250.

FORM APPROVED: OMB 0581-0055, Expires 1/31/91

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

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

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*: Pioneer Hi-Bred International, Inc.
2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.:
3. VARIETY NAME: 9593
4. ADDRESS *(street and no. or R.F.D. no., city, state, and ZIP)*: 700 Capital Square, 400 Locust Street, Des Moines, IA 50309
5. PHONE *(Include area code)*: 515-270-3414
6. GENUS AND SPECIES NAME: Glycine max
7. FAMILY NAME *(Botanical)*: Leguminosae
8. CROP KIND NAME *(Common Name)*: Soybean
9. DATE OF DETERMINATION: July, 1986
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*: Corporation
11. IF INCORPORATED, GIVE STATE OF INCORPORATION: Iowa
12. DATE OF INCORPORATION: 1926

FOR OFFICIAL USE ONLY

PVPO NUMBER: 9100184

FILING — Date: May 17, 1991 — Time: ☐ A.M. ☐ P.M.

FEES RECEIVED — Filing and Examination Fee: $ 2,150.— — Date: May 13 1991 — Certificate Fee: $ 250.— — Date: Aug. 31, 1992

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

James E. Miller, Ph.D.
7301 NW 62nd Ave., P.O. Box 85
Johnston, IA 50131-0085

Mary Helen Mitchell (copy)
700 Capital Square, 400 Locust Street
Des Moines, IA 50309
PHONE *(Include area code)*:

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow INSTRUCTIONS on reverse)*
   - a. [X] Exhibit A, Origin and Breeding History of the Variety.
   - b. [X] Exhibit B, Novelty Statement.
   - c. [X] Exhibit C, Objective Description of Variety.
   - d. [ ] Exhibit D, Additional Description of Variety.
   - e. [X] Exhibit E, Statement of the Basis of Applicant's Ownership.
   - f. [X] Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office 05/15/91.
   - g. [X] Filing and Examination Fee ($2,150) made payable to "Treasurer of the United States."

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See section 83(a) of the Plant Variety Protection Act.)* ☐ YES *(If "YES," answer items 16 and 17 below)* ☒ NO *(If "NO," skip to item 18 below)*

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☐ YES ☐ NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
   - ☐ YES *(If "YES," through* ☐ Plant Variety Protection Act ☐ Patent Act. Give date: _____ .)
   - ☒ NO

19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
   - ☐ YES (If "YES," give names of countries and dates)
   - ☒ NO

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.

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

SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE
James E. Miller	Worldwide Soybean Research Director	5/9/91
SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE

FORM CSSD-470 (5-89) Edition of FORM LS-470, 3-86, is obsolete.

Pioneer Hi-Bred International, Inc.
PVP Application Variety 9593 Soybean
April 1991

EXHIBIT A

Origin and Breeding History of 9593

Summer 1983	Original cross made at Greenville, MS. Cross number was 2768. Parentage - 2177-57 * 9561 2177-57 = 5482 * Centennial 9561 = Mack * Forrest
Winter 1983-84	F1 plants grown in Hawaii under artificial light
Summer 1984	F2 advanced to F3 by modified single seed descent at Greenville, MS.
Winter 1984-85	F3 advanced to F5 in Hawaii in two-generation advance by modified single seed descent.
Summer 1985	F5 bulks of 2768 grown in Greenville, MS and 150 plants selected.
Summer 1986	F6 progeny rows of 2768 grown in Greenville, MS. Row G6-10054 selected and composited.
Summer 1987	Yield tested G6-10054 as 2768-05 in three reps as entry 29 in test GRD602.
Winter 1987-88	Plants of 2768-05 were grown in Hawaii and harvested as individual plants to start strain purification.
Summer 1988	Yield tested as W2768-05 at twelve locations in the South and the Southeast by the Greenville station and at four locations in the Mid-South by the Union City station. Eighty progeny rows were grown and 68 rows were bulked as breeders seed.
Summer 1989	Yield tested as Y2768-05 at eleven locations in the South and the Southeast by the Greenville station and at four locations in the Mid-South by the Union City station. Three acres of breeders seed were grown in Greenville, MS.

Summer 1990	Yield tested as XB59C at eighteen locations in the South and the Southeast by the Greenville station and at eleven locations in the Mid-South by the Union City station. Approximately seventy acres of parent seed (foundation equivalent) were grown near Corning, AR.
January 1991	XB59C nominated for release and full production and assigned the designation 9593.
	Yield trials 1988-1990 and seed production 1989-1990 indicate that Variety 9593 is uniform and stable. As with other soybean varieties, variants can occur for almost any character during the course of repeated sexual production.

Pioneer Hi-Bred International, Inc.
PVP Application 9593 Soybean
April 1991

Exhibit B

Variety 9593 is most similar to the varieties 9592, S6995, Bedford and A5980. However, 9593 differs from 9592 in resistance to southern rootknot; 9592 is susceptible and 9593 is resistant. In comparison to S6995, Bedford and A5980, 9593 is susceptible to soybean cyst nematode race~~s~~ [redacted] 4; whereas S6995, A5980 and Bedford are resistant to race 4. JLS, 26 June 1992

Dear Jeff:

According to the Soybean Genetics Newsletter Vol. 14 page 274, HT 5203 is resistant to Phytophthora megasperma race 1. Variety '9593' is susceptible.

According to Mississippi Agricultural and Forestry Experiment Station Information Bulletin 136 (1988 Variety Trials) page 54, and also the 1989 Mississippi Variety Trial Bulletin page 52, the breeder reported Terra-Vig 553 is resistant to Phytophthora megasperma. Again, variety '9593' is susceptible.

Included with this note is some data showing that the nearly 6 inches difference in height observed between '9593' and 'Forrest' in 1990 would occur by chance fewer than one time in one thousand.

I believe this completes your data request for application 9100184, variety '9593'. If you need more information, please let me know. Thanks.

John

Supplement to Exhibit B, Variety '9593'. July 23, 1992.

Table 1. Variety '9593' (X1) vs 'Forrest' (X2) for height in inches.

All observations are from plots planted using a randomized complete block design. Planted plot length was 21 feet, trimmed to 15 feet. Plot width was 4 30 inch rows, or 10 feet. Height was scored as the average height of the entire plot. All data was taken in 1990.

	9593	FORREST		
REP	X1	X2	X1-X2	(X1-X2)**2
1	53	45	8	64
2	44	38	6	36
3	48	42	6	36
4	36	30	6	36
5	36	31	5	25
6	27	23	4	16
sum	244	209	35	213
ave	40.67	34.83	5.833	

SD**2= (213 - (35**2)/6) / (5 * 6)
SD**2= 0.29444
SD= 0.54263
t = 5.833 / 0.54263
t = 10.7502 ** significant .01 level
DF= 5

n = 6 groups of individuals

ave height of 9593 = 40.6667 inches
ave height of Forrest = 34.8333 inches

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN & SEED DIVISION
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Soybean)

OBJECTIVE DESCRIPTION OF VARIETY
SOYBEAN (Glycine max L.)

NAME OF APPLICANT(S)	TEMPORARY DESIGNATION	VARIETY NAME
Pioneer Hi-Bred International, Inc.		9593

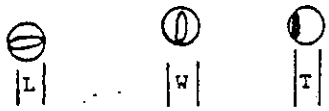
ADDRESS *(Street and No., or R.F.D. No., City, State, and Zip Code)*
700 Capital Square
400 Locust Street
Des Moines, IA 50309

FOR OFFICIAL USE ONLY
PVPO NUMBER
9100184

Choose the appropriate response which characterizes the variety in the features described below. When the number of significant digits in your answer is fewer than the number of boxes provided, place a zero in the first box when number is 9 or less (e.g., [0 | 9]). Starred characters ★ are considered fundamental to an adequate soybean variety description. Other characters should be described when information is available.

1. SEED SHAPE:

[2]



1 = Spherical (L/W, L/T, and T/W ratios = < 1.2)
2 = Spherical Flattened (L/W ratio > 1.2; L/T ratio = < 1.2)
3 = Elongate (L/T ratio > 1.2; T/W = < 1.2)
4 = Elongate Flattened (L/T ratio > 1.2; T/W > 1.2)

★ 2. SEED COAT COLOR: (Mature Seed)

[1] 1 = Yellow 2 = Green 3 = Brown 4 = Black 5 = Other *(Specify)* _____

3. SEED COAT LUSTER: (Mature Hand Shelled Seed)

[2] 1 = Dull ('Corsoy 79'; 'Braxton') 2 = Shiny ('Nebsoy'; 'Gasoy 17')

★ 4. SEED SIZE: (Mature Seed)

[1 | 5] Grams per 100 seeds

★ 5. HILUM COLOR: (Mature Seed)

[6] 1 = Buff 2 = Yellow 3 = Brown 4 = Gray 5 = Imperfect Black 6 = Black 7 = Other *(Specify)* _____

★ 6. COTYLEDON COLOR: (Mature Seed)

[1] 1 = Yellow 2 = Green

★ 7. SEED PROTEIN PEROXIDASE ACTIVITY:

[2] 1 = Low 2 = High

★ 8. SEED PROTEIN ELECTROPHORETIC BAND:

[ ] 1 = Type A ($SP1^a$) 2 = Type B ($SP1^b$)

★ 9. HYPOCOTYL COLOR:

[2] 1 = Green only ('Evans'; 'Davis') 2 = Green with bronze band below cotyledons ('Woodworth'; 'Tracy')
3 = Light Purple below cotyledons ('Beeson'; 'Pickett 71')
4 = Dark Purple extending to unifoliate leaves ('Hodgson'; 'Coker Hampton 266A')

★10. LEAFLET SHAPE:

[3] 1 = Lanceolate 2 = Oval 3 = Ovate 4 = Other *(Specify)* _____

6

11. LEAFLET SIZE:

[2] 1 = Small ('Amsoy 71'; 'A5312') 2 = Medium ('Corsoy 79'; 'Gasoy 17') 3 = Large ('Crawford'; 'Tracy')

12. LEAF COLOR:

[2] 1 = Light Green ('Weber'; 'York') 2 = Medium Green ('Corsoy 79'; 'Braxton') 3 = Dark Green ('Gnome'; 'Tracy')

★ **13. FLOWER COLOR:**

[1] 1 = White 2 = Purple 3 = White with purple throat

★ **14. POD COLOR:**

[1] 1 = Tan 2 = Brown 3 = Black

★ **15. PLANT PUBESCENCE COLOR:**

[2] 1 = Gray 2 = Brown (Tawny)

16. PLANT TYPES:

[2] 1 = Slender ('Essex'; 'Amsoy 71') 2 = Intermediate ('Amcor'; 'Braxton') 3 = Bushy ('Gnome'; 'Govan')

★ **17. PLANT HABIT:**

[1] 1 = Determinate ('Gnome'; 'Braxton') 2 = Semi-Determinate ('Will') 3 = Indeterminate ('Nebsoy'; 'Improved Pelican')

★ **18. MATURITY GROUP:**

[0][8] 1 = 000 2 = 00 3 = 0 4 = I 5 = II 6 = III 7 = IV 8 = V 9 = VI 10 = VII 11 = VIII 12 = IX 13 = X

★ **19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)**

BACTERIAL DISEASES:

★ [2] Bacterial Pustule *(Xanthomonas phaseoli* var. *sojensis)*

★ [2] Bacterial Blight *(Pseudomonas glycinea)*

★ [2] Wildfire *(Pseudomonas tabaci)*

FUNGAL DISEASES:

★ [0] Brown Spot *(Septoria glycines)*

Frogeye Leaf Spot *(Cercospora sojina)*

★ [0] Race 1 [0] Race 2 [0] Race 3 [0] Race 4 [0] Race 5 [ ] Other *(Specify)*

[0] Target Spot *(Corynespora cassiicola)*

[0] Downy Mildew *(Peronospora trifoliorum* var. *manshurica)*

[0] Powdery Mildew *(Microsphaera diffusa)*

★ [0] Brown Stem Rot *(Cephalosporium gregatum)*

[1] Stem Canker *(Diaporthe phaseolorum* var. *caulivora)*

19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant) (Continued)

FUNGAL DISEASES: (Continued)

★ [0] Pod and Stem Blight *(Diaporthe phaseolorum var; sojae)*

[0] Purple Seed Stain *(Cercospora kikuchii)*

[0] Rhizoctonia Root Rot *(Rhizoctonia solani)*

Phytophthora Rot *(Phytophthora megasperma var. sojae)*

★ [~~0~~ 1] Race 1 [1] Race 2 [~~0~~ 1] Race 3 [~~0~~ 1] Race 4 [~~0~~ 1] Race 5 [~~0~~ 1] Race 6 [~~0~~ 1] Race 7

[~~0~~ 1] Race 8 [~~0~~ 1] Race 9 [1] Other *(Specify)* Race 19, 10

JLS, 23 July 1992

VIRAL DISEASES:

[0] Bud Blight (Tobacco Ringspot Virus)

[0] Yellow Mosaic (Bean Yellow Mosaic Virus)

★ [0] Cowpea Mosaic (Cowpea Chlorotic Virus)

[0] Pod Mottle (Bean Pod Mottle Virus)

★ [1] Seed Mottle (Soybean Mosaic Virus)

NEMATODE DISEASES:

RWS
6-4-92

Soybean Cyst Nematode *(Heterodera glycines)*

★ [0] Race 1 [0] Race 2 [~~0~~ 2] Race 3 [~~0~~ 1] Race 4 [ ] Other *(Specify)* _____

[0] Lance Nematode *(Hoplolaimus Colombus)*

★ [2] Southern Root Knot Nematode *(Meloidogyne incognita)*

★ [0] Northern Root Knot Nematode *(Meloidogyne Hapla)*

[0] Peanut Root Knot Nematode *(Meloidogyne arenaria)*

[0] Reniform Nematode *(Rotylenchulus reniformis)*

[ ] OTHER DISEASE NOT ON FORM *(Specify)*: _____

20. PHYSIOLOGICAL RESPONSES: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

★ [0] Iron Chlorosis on Calcareous Soil

[ ] Other *(Specify)* _____

21. INSECT REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

[0] Mexican Bean Beetle *(Epilachna varivestis)*

[0] Potato Leaf Hopper *(Empoasca fabae)*

[ ] Other *(Specify)* _____

22. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED.

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant Shape	9592	Seed Coat Luster	9592
Leaf Shape	9592	Seed Size	A5980
Leaf Color	9592	Seed Shape	9592
Leaf Size	9592	Seedling Pigmentation	9592
			8

23. GIVE DATA FOR SUBMITTED AND SIMILAR STANDARD VARIETY: Paired Comparison Data

VARIETY	NO. OF DAYS MATURITY	PLANT LODGING SCORE	CM PLANT HEIGHT	LEAFLET SIZE		SEED CONTENT		SEED SIZE G/100 SEEDS	NO. SEEDS/ POD
				CM Width	CM Length	% Protein	% Oil		
9593 Submitted	135.6	2.4	91			41.6	21.5	15.3	
9592 Name of Similar Variety	136.8	2.3	93			41.8	22.5	18.8	

PUBLICATIONS USEFUL AS REFERENCE AIDS FOR COMPLETING THIS FORM:

1. Caldwell, B.E., ed. 1973. Soybeans: Improvement, Production, and Uses. Amer. Soc. Agron. Monograph No. 16.
2. Buttery, B.R. and R.I. Buzzell. 1968. Peroxidase activity in seeds of soybean varieties. Crop Sci., 8: 722-725.
3. Hymowitz, T. 1973. Electrophoretic analysis of SBTI-A_2 in the USDA soybean germplasm collection. Crop Sci., 13: 420-421.
4. Payne, R.C. and L.F. Morris. 1976. Differentiation of soybean cultivars by seedling pigmentation patterns. J. Seed Technol. 1: 1-19.

Pioneer Hi-Bred International, Inc.
PVP Application 9593 Soybean
April 1991

Exhibit E

Pioneer Hi-Bred International, Inc. is the sole, original, and first breeder of soybean variety 9593, for which it solicits a certificate of protection.