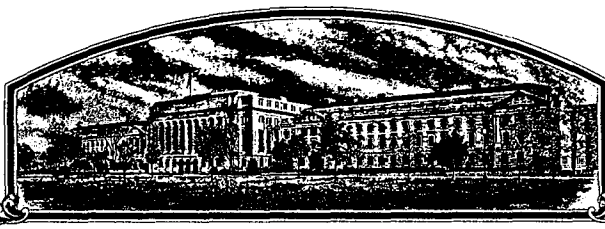


No.

8800211



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, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (AT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN

'PHM49'

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 31st day of January in the year of our Lord one thousand nine hundred and eighty-nine.

Attest:

Kenneth A. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Clayton Yeutter
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

FORM APPROVED: OMB NO. 0581-0055

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

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

1. NAME OF APPLICANT(S) Pioneer Hi-Bred International, Inc.		2. TEMPORARY DESIGNATION		3. VARIETY NAME PHM49	
4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) Plant Breeding Division Department of Corn Breeding PO Box 85 Johnston, IA 50131-0085		5. PHONE (Include area code) 515/270-3300		FOR OFFICIAL USE ONLY PVPO NUMBER 8800211	
6. GENUS AND SPECIES NAME Zea mays		7. FAMILY NAME (Botanical) Gramineae		FILING DATE Aug. 9, 1988 TIME 1:30 <input type="checkbox"/> A.M. <input checked="" type="checkbox"/> P.M.	
8. KIND NAME Corn		9. DATE OF DETERMINATION 1984		AMOUNT FOR FILING \$ 1800.00 DATE Aug. 4, 1988 AMOUNT FOR CERTIFICATE \$ 200.00 DATE Nov 25, 1988	
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.) Corporation				12. DATE OF INCORPORATION May 6, 1926	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION Iowa					
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS Dr. Richard L. McConnell Plant Breeding Division Pioneer Hi-Bred International, Inc. PO Box 85 Johnston, IA 50131-0085 PHONE (Include area code): 515/270-3363					
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.) b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement. c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of Variety (Request form from Plant Variety Protection Office.) d. <input checked="" type="checkbox"/> Exhibit D, Additional Description of Variety. e. <input checked="" type="checkbox"/> Exhibit E, Statement of the Basis of Applicant's Ownership.					
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.) <input type="checkbox"/> Yes (If "Yes," answer items 16 and 17 below) <input checked="" type="checkbox"/> No					
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> Yes <input type="checkbox"/> No		17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input type="checkbox"/> Foundation <input type="checkbox"/> Registered <input type="checkbox"/> Certified			
18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? <input type="checkbox"/> Yes (If "Yes," give date) <input checked="" type="checkbox"/> No					
19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES? <input type="checkbox"/> Yes (If "Yes," give names of countries and dates) <input checked="" type="checkbox"/> 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 Pioneer Hi-Bred International, Inc.				DATE	
SIGNATURE OF APPLICANT by: Richard L. McConnell				DATE August 1, 1988	

14A. Exhibit A. Origin and Breeding History

Pedigree: PHB81/PHR33)XM213X

Pioneer line PHM49, Zea mays L., a yellow dent corn inbred was developed by Pioneer Hi-Bred International, Inc. from the single cross PHB81 x PHR33 using the pedigree method of breeding. The progenitors of PHM49 are proprietary inbred lines of Pioneer Hi-Bred International, Inc. Selfing and selection were practiced within the above F1 cross for five generations in the development of PHM49 at York, Nebraska. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at York, Nebraska, and at other Pioneer research stations in the mid maturity areas of the U.S. Corn Belt. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated for observations for uniformity.

PHM49 has shown uniformity and stability for all traits as described in Exhibit C (form LPGS-470-28) - "Objective Description of Variety." It has been self-pollinated and ear-rowed a sufficient number of generations with careful attention paid to uniformity of plant type to assure genetic homozygosity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity.

PHM49 has been observed to occasionally produce dwarf inbred plants at a relatively low frequency. This appears to have little or no detrimental effect on performance in hybrid combinations.

No variant traits have been observed or are expected in PHM49.

14B. Exhibit B. Novelty Statement

PHM49 is similar to the Pioneer inbred line G35 (PVP Cert. No. 8300140). PHM49 has red anthers and green silks whereas G35 has yellowish-brown anthers and red silks. PHM49 also sheds and silks earlier than G35.

<u>Inbred</u>	<u>GDU</u> <u>50% Shed</u>	<u>GDU</u> <u>50% Silk</u>
PHM49	1489	1531
G35	1525	1567
No. Reps	54	45
Diff.	36	37
Prob.	.000#	.000#

* = 10% significance; + = 5% significance; # = 1% significance

Data from 8 locations in 1985, 12 in 1986, and 20 in 1987.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Corn)

OBJECTIVE DESCRIPTION OF VARIETY
CORN (ZEA MAYS)

NAME OF APPLICANT(S) Pioneer Hi-Bred International, Inc.	FOR OFFICIAL USE ONLY PVPO NUMBER 8800211
ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code) Plant Breeding Division Department of Corn Breeding PO Box 85 Johnston, Iowa 50131-0085	VARIETY NAME OR TEMPORARY DESIGNATION PHM47 PHM49 9/6/88

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g., or) when number is either 99 or less or 9 or less.

1. TYPE:

1 = SWEET 2 = DENT 3 = FLINT 4 = FLOUR 5 = POP 6 = ORNAMENTAL

2. REGION WHERE BEST ADAPTED IN THE U.S.A.:

1 = NORTHWEST 2 = NORTHCENTRAL 3 = NORTHEAST 4 = SOUTHEAST
5 = SOUTHCENTRAL 6 = SOUTHWEST 7 = MOST REGIONS

3. MATURITY (In Region of Best Adaptability):

(Under "comments" (pg. 3) state how
heat units were calculated)

DAYS FROM EMERGENCE TO 50% OF PLANTS IN SILK

HEAT UNITS

DAYS FROM 50% SILK TO OPTIMUM EDIBLE QUALITY

HEAT UNITS

DAYS FROM 50% SILK TO HARVEST AT 25% KERNEL MOISTURE

HEAT UNITS

4. PLANT:

CM. HEIGHT (To tassel tip)

CM. EAR HEIGHT (To base of top ear)

CM. LENGTH OF TOP EAR INTERNODE

Number of Tillers:

1 = NONE 2 = 1-2 3 = 2-3 4 = > 3

Number of Ears Per Stalk:

1 = SINGLE 2 = SLIGHT TWO-EAR TENDENCY
3 = STRONG TWO-EAR TENDENCY 4 = THREE-EAR TENDENCY

Cytoplasm Type:

1 = NORMAL 2 = "T" 3 = "S" 4 = "C" 5 = OTHER (Specify) _____

5. LEAF (Field Corn Inbred Examples Given):

Color:

1 = LIGHT GREEN (HY) 2 = MEDIUM GREEN (WF9) 3 = DARK GREEN (B14) 4 = VERY DARK GREEN (K166)

Angle from Stalk (Upper half):

1 = < 30° 2 = 30-60° 3 = > 60°

Sheath Pubescence:

1 = LIGHT (W22) 2 = MEDIUM (WF9)
3 = HEAVY (OH26)

Marginal Waves:

1 = NONE (HY) 2 = FEW (WF9) 3 = MANY (OH7L)

Longitudinal Creases:

1 = ABSENT (OH51) 2 = FEW (OH56A)
3 = MANY (PA11)

Width:

CM. WIDEST POINT OF EAR NODE LEAF

Length:

CM. EAR NODE LEAF

NUMBER OF LEAVES PER MATURE PLANT

4

6. TASSEL:

07

NUMBER OF LATERAL BRANCHES

Branch Angle from Central Spike:

2

1 = < 30°

2 = 30-40°

3 = > 45°

Penduncle Length:

28

CM. FROM TOP LEAF TO BASAL BRANCHES

Pollen Shed:

3

1 = LIGHT (WF9)

2 = MEDIUM

3 = HEAVY (KY21)

3

Anther Color:

1 = YELLOW

2 = PINK

3 = RED

4 = PURPLE

5 = GREEN

5

Glume Color:

6 = OTHER (Specify) _____

Pollen Restoration for Cytoplasm (0 = Not Tested, 1 = Partial, 2 = Good)

0

"T"

0

"S"

0

"C"

OTHER (Specify Cytoplasm and degrees of restoration) _____

7. EAR (Husked Ear Data Except When Stated Otherwise):

18

CM LENGTH

43

MM. MID-POINT
DIAMETER

138

GM. WEIGHT

Kernel Rows:

2

1 = INDISTINCT

2 = DISTINCT

16

NUMBER

1

1 = STRAIGHT

2 = SLIGHTLY CURVED

3 = SPIRAL

Silk Color (Exposed at Silking Stage):

1

1 = GREEN

2 = PINK

3 = SALMON

4 = RED

Husk Color:

1

FRESH

1 = LIGHT GREEN

2 = DARK GREEN

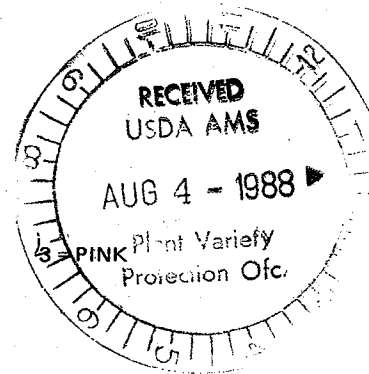
6

DRY

4 = RED

5 = PURPLE

6 = BUFF



Husk Extension: (Harvest Stage)

2

1 = SHORT (Ears Exposed) 2 = MEDIUM (Barely Covering Ear)

3 = LONG (8-10CM Beyond Ear Tip)

4 = VERY LONG (> 10 CM)

Husk Leaf:

1 = SHORT (< 8 CM)

2 = MEDIUM (8-15 CM)

3 = LONG (> 15 CM)

Shank:

13

CM LONG

6

NO. OF INTERNODES

Position at Dry Husk Stage:

1

1 = UPRIGHT

2 = HORIZONTAL

3 = PENDENT

Taper:

2

1 = SLIGHT

2 = AVERAGE

3 = EXTREME

Drying Time (Unhusked Ear):

1 = SLOW

2 = AVERAGE

3 = FAST

8. KERNEL (Dried):

Size (From Ear Mid-Point):

12

MM LONG

07

MM. WIDE

04

MM. THICK

Shape Grade (% Rounds)

2

1 = < 20

2 = 20-40

3 = 40-60

4 = 60-80

5 = > 80

8. KERNEL (Dried) :

1 Pericarp Color: 1 = COLORLESS 2 = RED-WHITE CROWN 3 = TAN 4 = BRONZE
 5 = BROWN 6 = LIGHT RED 7 = CHERRY RED
 8 = VARIEGATED (Describe) _____

1 Aleurone Color: 1 = HOMOZYGOUS 2 = SEGREGATING (Describe) _____

9 1 = WHITE 2 = PINK 3 = TAN 4 = BROWN 5 = BRONZE 6 = RED
 7 = PURPLE 8 = PALE PURPLE 9 = VARIEGATED (Describe) Yellow
 (Other) _____

3 Endosperm Color: 1 = WHITE 2 = PALE YELLOW 3 = YELLOW 4 = PINK-ORANGE 5 = WHITE CAP.

Endosperm Type:

3 1 = SWEET (su1) 2 = EXTRA SWEET (sh2) 3 = NORMAL STARCH 4 = HIGH AMYLOSE STARCH
 5 = WAXY STARCH 6 = HIGH PROTEIN 7 = HIGH LYSINE 8 = OTHER (Specify) _____

GM. WEIGHT /100 SEEDS (Unsize Sample)

9. COB:

10 MM. DIAMETER AT MID-POINT

Strength:

2 1 = WEAK 2 = STRONG

Color:

3 1 = WHITE 2 = PINK 3 = RED 4 = BROWN
 5 = VARIEGATED 6 OTHER (Specify) _____

10. DISEASE RESISTANCE (0 = Not Tested, 1 = Susceptible, 2 = Resistant):

0 STALK ROT (Diplodia)	0 STALK ROT (Fusarium)	0 STALK ROT (Gibberella)
2 NORTHERN LEAF BLIGHT	1 SOUTHERN LEAF BLIGHT	2 SMUT (common)
0 SOUTHERN RUST	2 CORN SMUT (head)	2 BACTERIAL WILT
2 BACTERIAL LEAF BLIGHT	1 MAIZE DWARF MOSAIC	0 STUNT
OTHER (Specify) (Goss')		(Stewart's)

11. INSECT RESISTANCE (0 = Not Tested, 1 = Susceptible, 2 = Resistant):

1 CORNBORER	0 EARWORM	0 SAPBEETLE	0 APHID
0 ROOTWORM (Northern)	0 ROOTWORM (Western)		
0 ROOTWORM (Southern)	OTHER (Specify) _____		

12. VARIETIES MOST CLOSELY RESEMBLING THAT SUBMITTED FOR THE CHARACTERS GIVEN:

CHARACTER	VARIETY	CHARACTER	VARIETY
Maturity	G35	Kernel Type	G35
Plant Type	G35	Quality (Edible)	
Ear Type	G35	Usage	G35

REFERENCES:

U.S. Department Agriculture. Yearbook 1937.
 Corn: Culture, Processing, Products. 1970 Avi Publishing Company, Westport, Connecticut. (Numerous (Authors)
 Emerson, R.A., G.W. Beadle, and A.C. Fraser. A Summary of Linkage Studies in Maize. Cornell A.E.S., Mem. 180. 1935.
 The Mutants of Maize. 1968. Crop Science Society of America. Madison, Wisconsin.
 Stringfield, G.H. Maize Inbred Lines of Ohio. Ohio A.E.S. Bul. 831. 1959.
 Butler, D.R. 1954 - A System for the Classification of Corn Inbred Lines - PhD. Thesis, Ohio State University.

COMMENTS: Heat units are accumulated from daily temperatures as follows:
 HI = Maximum air temperature in Fahrenheit, but not greater than 86.
 LO = Minimum air temperature in Fahrenheit, but not less than 50.
 Heat Units = (HI + LO)/2 - 50, but not less than 0.

14D. Additional Description of PHM49.

PHM49 is a yellow dent inbred line of corn, Zea mays L.

As an inbred per se, PHM49 is similar to the Pioneer proprietary inbred G35. These similarities are expected because some of each inbred's parentage traces back several generations to a common grandparent. The other parents involved in the development of both PHM49 and G35 are proprietary Pioneer inbred lines.

For comparative purposes, data are attached with comparisons of PHM49 to the Pioneer proprietary inbred line G35.

14D. Exhibit D. Comparison of PHM49 and G35 crossed to the same tester lines and the hybrids evaluated at the same locations.

INBRED	PRM	SEL IND	% YLD	% YLD	GDU SHED	STK LDG	RT LDG	BAR PLTS	STAY GREEN	TST WT	COB SCO	GRN QUAL	SDLG VIG	EST CNT	PLT HT	EAR HT	DRPD EARS	BRTL STKS
No. Reps	55	55	55	55	12	35	16	10	27	55	2	27	35	47	30	30	21	8
G35	124	103	151	102	99	102	100	100	120	101	86	103	101	101	99	101	100	99
PHM49	121	101	147	100	97	99	96	100	104	101	98	114	97	102	98	99	99	119
DIFF.	3	2	4	2	3	3	4	0	16	0	8	11	4	1	1	2	1	10

LEGEND:

PRM Predicted Relative Minnesota Maturity
 Sel Ind Selection Index
 Yld Yield (Bu/Acre adjusted to 15.5% moisture)
 % Yld Yield in percent of test mean
 Mst Moisture (percent of test mean)
 GDU Shed 50% pollen shed (actual growing degree units)
 GDU Silk 50% silk (actual growing degree units)
 Stk Ldg Stalk Lodging (percent of test mean)
 Rt Ldg Root Lodging (percent of test mean)
 Bar Plts Barren Plants (percent of test mean)
 Stay Green Stay Green (percent of test mean)
 Tst Wt Test Weight (percent of test mean)
 Grn Qual Grain Quality (percent of test mean)
 Cob Sco Cob Score (percent of test mean)
 Sdlg Vig Seedling Vigor (percent of test mean)
 Est Cnt Early Stand Count (percent of test mean)
 Plt Ht Plant Height (percent of test mean)
 Ear Ht Ear Height (percent of test mean)
 Drpd Ears Dropped Ears (percent of test mean)
 Brtl Stks Brittle Stalks (percent of test mean)

2

14D. Exhibit D. Inbred per se yield test comparison of PHM49 and G35 grown at the same locations in the same year.

INBRED	YLD	% YLD	MST	GDU SHED	GDU SILK	STK LDG	RT LDG	BAR PLTS	STAY GREEN	TST WT	GRN QUAL	SDLG VIG	EST CNT	PLT HT	EAR HT	DRPD EARS	BRTL STKS
PHM49	68	91	107	1490	1590	101	104	--	139	100	108	76	85	97	95	100	108
G35	81	110	98	1530	1600	99	104	--	113	99	94	91	96	95	106	100	107
DIFFERENCE	13	19	9	40	10	2	0	--	26	1	14	15	11	2	15	0	1
NO. OF REPS	22																

LEGEND:

Yld Yield (Bu/Acre adjusted to 15.5% moisture)
 % Yld Yield in percent of test mean
 Mst Moisture (percent of test mean)
 GDU Shed 50% pollen shed (actual growing degree units)
 GDU Silk 50% silk (actual growing degree units)
 Stk Ldg Stalk Lodging (percent of test mean)
 Rt Ldg Root Lodging (percent of test mean)
 Bar Plts Barren Plants (percent of test mean)
 Stay Green Stay Green (percent of test mean)
 Tst Wt Test Weight (percent of test mean)
 Grn Qual Grain Quality (percent of test mean)
 Sdlg Vig Seedling Vigor (percent of test mean)
 Est Cnt Early Stand Count (percent of test mean)
 Plt Ht Plant Height (percent of test mean)
 Ear Ht Ear Height (percent of test mean)
 Drpd Ears Dropped Ears (percent of test mean)
 Brtl Stks Brittle Stalks (percent of test mean)

14E. Exhibit E. Statement of the Basis of Applicant's Ownership

Pioneer Hi-Bred International, Inc., Des Moines, Iowa, is the employer of the plant breeders involved in the development and evaluation of PHM49. Pioneer Hi-Bred International, Inc. has the sole rights and ownership of PHM49.