No. 200000198

# 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 DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE 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 TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

*CORN, FIELD*

*'PH5D6'*

*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 sixth day of November, in the year two thousand one.*

*Attest:*

*Commissioner*
*Plant Variety Protection Office*
*Agricultural Marketing Service*

*Secretary of Agriculture*

REPRODUCE LOCALLY. *Include form number and date on all reproductions.* FORM APPROVED - OMB NO. 0581-0055

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

# APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

*(Instructions and information collection burden statement on reverse)*

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

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

1. NAME OF OWNER: Pioneer Hi-Bred International, Inc.
2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER:
3. VARIETY NAME: PH5D6
4. ADDRESS (*Street and No. or RFD No., City, State and Zip Code, and Country*): 7301 NW 62nd Avenue, P.O. Box 85, Johnston, IA 50131-0085
5. TELEPHONE (*Include area code*): 515/270-4051
6. FAX (*Include area code*): 515/253-2125

FOR OFFICIAL USE ONLY
PVPO NUMBER: 200000198
FILING DATE: 3/27/00

7. IF THE OWNERNAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (*corporation, partnership, association, etc.*): Corporation
8. IF INCORPORATED, GIVE STATE OF INCORPORATION): IOWA
9. DATE OF INCORPORATON: March 5, 1999

10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION (FIRST PERSON LISTED WILL RECEIVE ALL PAPERS)

Steven R. Anderson
Research and Product Development
P.O. Box 85
Johnston, IA 50131-0085

FEES RECEIVED
FILING & EXAMINATION FEES: $ 2450.00 DATE 3.27.00
CERTIFICATION FEE: $ 320.00 DATE 10/15/01

11. TELEPHONE (*Include area code*): 515/270-4051
12. FAX (*Include area code*): 515/253-2125
13. E_MAIL: ANDERSONS@PHIBRED.COM
14. CROP KIND NAME (*Common name*): CORN
15. GENUS AND SPECIES NAME OF CROP: Zea Mays
16. FAMILY NAME (*Botanical*): Gramineae TRM 9/12/00
17. IS THE VARIETY A FIRST GENERATION HYBRID? ☐ Yes ☒ No

18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (*Follow instructions on reverse*)
- a. ☒ Exhibit A. Origin and Breeding History of the Variety
- b. ☒ Exhibit B. Statement of Distinctness
- c. ☒ Exhibit C. Objective Description of the Variety
- d. ☒ Exhibit D. Additional Description of the Variety (*Optional*)
- e. ☒ Exhibit E. Statement of the Basis of the Owner's Ownership
- f. ☒ Voucher Sample (*2500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository*)
- g. ☒ Filing and Examination Fee ($2,450), made payable to "Treasurer of the United States" (*Mail to Plant Variety Protection Office*))

19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? See Section 83(a) of the Plant Variety Protection Act)
☐ YES (If "yes", answer items 20 and 21 below) ☒ NO (If "no", go to item 22)

20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES ☐ NO

21. IF "YES" TO ITEM 20, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U.S. OR OTHER COUNTRIES?
☒ YES ☐ NO

IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (*Please use space indicated on reverse*)

23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)?
☐ YES ☒ NO

IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (*Please use space indicated on reverse.*)

24. The owner(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

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

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

| SIGNATURE OF OWNER | | SIGNATURE OF OWNER: Steven R Anderson | |
|---|---|---|---|
| NAME (*Please print or type*) | | NAME (*Please print or type*): Steven R. Anderson | |
| CAPACITY OR TITLE | DATE | CAPACITY OR TITLE: Senior Research Associate | DATE: 3-23-00 |

# INSTRUCTIONS

GENERAL: To be effectively filed with the Plant Variety protection Office (PVPO), ALL of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed Exhibits A,B,C,E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety sy Irsdy 2,500 untreated seeds of each line necessary to reproduce the variety, or for tuber reproduced varieties verification that a viable (in the sense that it will reproduce an entire plant) tissue culture will be deposited and maintained in a approved public repository; (4) check drawn on a U.S. bank for $2,450 ($300 filing fee and $2,150 examination fee), payable to "Treasurer of the United States" *(See Section 97.6 of the Regulations and Rules of Practice.)* Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfiled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 500, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. DO NOT use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of $300 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office
Telephone: (301)504-5518
FAX: (301)504-5291
Homepage: http://www.ams.usda.gov/science/pvp.htm

ITEM

18a. Give:
(1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified.

18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens of photographs (prints) of seed and plant comparisons which clearly indicate distinctness.

18c. Exhibit C forms are available from the PVPO for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.

18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant disease resistance, etc.

18e. Section 52(5) of the Act required applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.

19. If "Yes" is specified *(seed of this variety be sold by variety name only, as a class of* certified seed), the applicant may NOT reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, applicant may change the choice. *(See Regulations and Rules of Practice, Section 7.103).*

22. *See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.*

23. See Section 5.5 of the Act for instructions on claiming the benefit of an earlier filing date.

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

Nov. 1, 1999; United States

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

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NOTES; It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. *(See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of Regulations and Rules of Practice.)*

To avoid conflict with other variety names in use, the applicant should check the variety names proposed by contacting: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center--East, Beltsville, MD 20705. Telephone: (301) 504-8089.

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*Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate of any other aspect of this collection of information, including suggestions for reducing this burden , to Department of Agriculture, Clearance Officer, OIRM, AG Box 7630, Jamie L. Whitten Building, Washington, D.C. 20250. When replying, refer to OMB No. 0581-0055 and form number in your letter. Under the PRA of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.*

*The U.S. Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs). Persons with disabilities who require alternative means for communication of program information (braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202) 720-2791. To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C. 20250, or call (202) 720-7327 (voice) or (202) 720-1127 (TDD). USDA is an equal employment opportunity employer.*

Exhibit A. Origin and Breeding History

Pedigree: PH1P5/PHR03)WGX52313X

Pioneer Line PH5D6, *Zea mays L.*, a white, flint-like corn inbred, was developed by Pioneer Hi-Bred International, Inc. from the single cross hybrid PH1P5 X PHR03 (PVP Certificate No. 9100097) using the pedigree method plant breeding. Varieties PH1P5 and PHR03 are proprietary inbred lines of Pioneer Hi-Bred International, Inc. Selfing was practiced from the above hybrid for 7 generations using pedigree selection. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Garden City, Kansas as well as other Pioneer research locations. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated with observations again made for uniformity.

Variety PH1P5 was derived from the single cross hybrid PHT60 (PVP Certificate No. 8800219) X PHJ65 (PVP Certificate No. 9000245). Variety PHT60 and PHJ65 are proprietary inbred lines of Pioneer Hi-Bred International, Inc.

Variety PH5D6 has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". It has been self-pollinated and ear-rowed 5 generations with careful attention paid to selection criteria and uniformity of plant type to assure genetic homozygousity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity and stability for 3 generations during the final stages of inbred development and seed multiplication. Very high standards for genetic purity have been established morphologically using field observations and electrophoretically using sound lab molecular marker methodology.

No variant traits have been observed or are expected in PH5D6.

The criteria used in the selection of PH5D6 were white endosperm color, yield, both per se and in hybrid combinations; late season plant health, grain quality, stalk lodging resistance, and kernel size, especially important in production. Other selection criteria include: ability to germinate in adverse conditions; number of tillers, especially important in production because having numerous tillers increases hybrid production costs spent on detasseling; disease and insect resistance; pollen yield and tassel size.

Exhibit A: Developmental history for PH5D6



| Season/Year Pedigree Grown | Inbreeding Level of Pedigree Grown |
|---|---|
| Summer/1993 PH1P5, PHR03 | F0 |
| Winter/1993 PH1P5/PHR03 | F1 |
| Summer/1994 PH1P5/PHR03)WGX | F2 |
| Summer/1995 PH1P5/PHR03)WGX5 | F3 |
| Winter/1995 PH1P5/PHR03)WGX52 | F4 |
| Summer/1996 PH1P5/PHR03)WGX523 | F5 |
| Winter/1996 PH1P5/PHR03)WGX5231 | F6 |
| Summer/1997 PH1P5/PHR03)WGX52313 | F7 |
| PH1P5/PHR03)WGX52313X | F8 |

*PH5D6 was selfed and ear-rowed from F3 through F7 generation.
#Uniformity and stability were established from F5 through F7 generation and beyond when seed supplies were increased.

Exhibit B: Novelty Statement

Variety PH5D6 mostly resembles Pioneer Hi-Bred International, Inc. proprietary inbred line PHT60 (PVP Certificate No. 8800219). The data in Tables 1A and 1B are from paired comparisons collected primarily in Johnston and Ankeny, IA. The data in Table 2 are from paired comparisons at multiple locations grown primarily in the adapted growing area of PH5D6. The traits collectively show measurable differences between the two varieties.

Variety PH5D6 has longer tassel central spike length (29.7 cm vs 22.3 cm) than PHT60 (Table 1A, 1B).

Variety PH5D6 has longer tassel length (62.9 cm vs 53.3 cm) than PHT60 (Table 1A, 1B).

Variety PH5D6 has heavier pollen weight (POLWT) (337.2 g/100 tassels vs 120.0 g/100 tassels) than PHT60 (Table 2).

Variety PH5D6 has a greater tassel dry weight before pollen shed (TASWT) (6.1 g/tassel vs 3.4 g/tassel) than PHT60 (Table 2).

Variety PH5D6 has a greater tassel size score (TASSZ) (6.0 vs 4.8) than PHT60 (Table 2).

Variety PH5D6 has taller plant height (PLTHT) (216.9 cm vs 203.2 cm) than PHT60 (Table 2).

JMS 9/19/01

A t-test was used to compare differences between means and the appropriate parameters have been included. Due to the way our historical data has been stored, it is difficult to obtain standard deviations for table 2.

## Exhibit B Novelty Statement Tables

**Table 1A. These data indicate differences between varieties PH5D6 and PHT60. Data are from Johnston and Ankeny, Iowa at 3 environments in 1999. A t-test was used to compare differences between means. Five plants were measured at each location.**

| station | loc | year | Traits | variety-1 | variety-2 | Count-1 | Count-2 | Mean-1 | Mean-2 | Mean -Diff | StdDeviation-1 | StdDeviation-2 | StdError-1 | StdError-2 | DF Pooled | t-Value Pooled | Prob (2-tail) Pooled |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD | 20N | 1999 | tassel central spike length (cm) | PH5D6 | PHT60 | 5 | 5 | 25.8 | 19.0 | 6.8 | 1.924 | 3.162 | 0.860 | 1.414 | 8 | 4.11 | 0.003 |
| JH | Y212 | 1999 | tassel central spike length (cm) | PH5D6 | PHT60 | 5 | 5 | 32.8 | 24.8 | 8.0 | 1.095 | 2.864 | 0.490 | 1.281 | 8 | 5.83 | 0.000 |
| IT | NF | 1999 | tassel central spike length (cm) | PH5D6 | PHT60 | 5 | 5 | 30.6 | 23.2 | 7.4 | 2.302 | 0.837 | 1.030 | 0.374 | 8 | 6.76 | 0.000 |
| AD | 20N | 1999 | tassel length (cm) | PH5D6 | PHT60 | 5 | 5 | 57.8 | 49.2 | 8.6 | 4.970 | 5.805 | 2.223 | 2.596 | 8 | 2.52 | 0.036 |
| IT | NF | 1999 | tassel length (cm) | PH5D6 | PHT60 | 5 | 5 | 64.8 | 53.6 | 11.2 | 3.421 | 1.140 | 1.530 | 0.510 | 8 | 6.95 | 0.000 |
| JH | Y212 | 1999 | tassel length (cm) | PH5D6 | PHT60 | 5 | 5 | 66.0 | 57.0 | 9.0 | 2.739 | 3.742 | 1.225 | 1.673 | 8 | 4.34 | 0.002 |

**Table 1B. Summary data from Johnston and Ankeny, Iowa across environments in 1999.**

| Year | Traits | variety-1 | variety-2 | Count-1 | Count-2 | Mean-1 | Mean-2 | Mean Diff | StdDeviation-1 | StdDeviation-2 | StdError-1 | StdError-2 | DF Pooled | t-Value Pooled | Prob (2-tail) Pooled |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1999 | tassel central spike length (cm) | PH5D6 | PHT60 | 15 | 15 | 29.7 | 22.3 | 7.4 | 3.474 | 3.436 | 0.897 | 0.887 | 28 | 5.87 | 0.000 |
| 1999 | tassel length (cm) | PH5D6 | PHT60 | 15 | 15 | 62.9 | 53.3 | 9.6 | 5.153 | 4.992 | 1.330 | 1.289 | 28 | 5.18 | 0.000 |

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Table 2. These data indicate differences between varieties PH5D6 and PHT60. Data are from multiple locations and years grown primarily in the adapted growing area.

Variety 1 = PH5D6
Variety 2 = PHT60

| | | | | | |
|---|---|---|---|---|---|
| Variety 1 | PH5D6 | | | | |
| Variety 2 | PHT60 | | | | |
| | | | | | |
| | | POL | TAS | PLT | TAS |
| | VAR | WT | SZ | HT | WT |
| YEAR | # | ABS | ABS | ABS | ABS |
| ---------- | ------ | ------ | ------ | CM | ------ |
| | | | | | |
| 1997 | 1 | | 5.5 | 214.6 | |
| | 2 | | 4.3 | 190.5 | |
| | LOCS | | 8 | 5 | |
| | PROB | | 0.011+ | 0.049+ | |
| | | | | | |
| 1998 | 1 | | 5.7 | 224.5 | |
| | 2 | | 4.8 | 209.6 | |
| | LOCS | | 13 | 8 | |
| | PROB | | 0.027+ | 0.036+ | |
| | | | | | |
| 1999 | 1 | 337.2 | 6.6 | 213.4 | 6.1 |
| | 2 | 120.0 | 5.1 | 204.0 | 3.4 |
| | LOCS | 8 | 11 | 13 | 8 |
| | PROB | .000# | 0.002# | 0.030+ | .000# |
| | | | | | |
| TOTAL SUM | 1 | 337.2 | 6.0 | 216.9 | 6.1 |
| | 2 | 120.0 | 4.8 | 203.2 | 3.4 |
| | LOCS | 8 | 32 | 26 | 8 |
| | DIFF | 217.1 | 1.2 | 13.97 | 2.7 |
| t-test | PROB | .000# | .000# | .000# | .000# |

Exhibit C

(Corn Maize)

United States Department of Agriculture, Agricultural Marketing Service
Science Division, Plant Variety Protection Office
National Agricultural Library Building, Room 500
Beltsville, MD 20705

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Objective Description of Variety
Corn (Zea mays L.)

| Name of Applicant (s) | Variety Seed Source | Variety Name or Temporary Designation |
|---|---|---|
| **Pioneer Hi-Bred International, Inc.** | | PH5D6 |
| Address (Street & No., or RFD No., City, State, Zip Code and Country | | FOR OFFICIAL USE |
| **7301 NW 62nd Avenue, P.O. Box 85, Johnston, Iowa 50131-0085** | | PVP0 Number |

Place the appropriate number that describes the varietal characters typical of this inbred variety in the spaces below. Right justify whole numbers by adding Leading zeroes if necessary. Completeness should be striven for to establish an adequate variety description. Traits designated by an '*' are considered Necessary for an adequate variety description and must be completed.

COLOR CHOICES (Use in conjunction with Munsell color code to describe all color choices: describe #25 and #26 in Comments section):

| | | | | |
|---|---|---|---|---|
| 01=Light Green | 06=Pale Yellow | 11=Pink | 16=Pale Purple | 21=Buff |
| 02=Medium Green | 07=Yellow | 12=Light Red | 17=Purple | 22=Tan |
| 03=Dark Green | 08=Yellow Orange | 13=Cherry Red | 18=Colorless | 23=Brown |
| 04=Very Dark Green | 09=Salmon | 14=Red | 19=White | 24=Bronze |
| 05=Green-Yellow | 10=Pink-Orange | 15=Red & White | 20=White Capped | 25=Variegated (Describe) |
| | | | | 26=Other (Describe) |

STANDARD INBRED CHOICES
(Use the most similar (in background and maturity) of these to make comparisons based on **grow-out trial data**):

| Yellow Dent Families: | | Yellow Dent (Unrelated): | Sweet Corn: |
|---|---|---|---|
| Family | Members | Co109, ND246, | C13, Iowa5125, P39, 2132 |
| B14 | CM105, A632, B64, B68 | Oh7, T232, | |
| B37 | B37, B76, H84 | W117, W153R, | Popcorn: |
| B73 | N192, A679, B73, NC268 | W18BN | SG1533, 4722, HP301, HP7211 |
| C103 | Mo17, Va102, Va35, A682 | | |
| Oh43 | A619, MS71, H99, Va26 | White Dent: | Pipecorn: |
| WF9 | W64A, A554, A654, Pa91 | C166, H105, Ky228 | Mo15W, Mo16W, Mo24W |

Groups on Lynx/Osborn/Grunst/98-99PVP

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EXHIBIT C: PH5D6

| 1. TYPE: (describe intermediate types in Comments section): | Standard Variety Name |
|---|---|
| 3 1=Sweet 2=Dent 3=Flint 4=Flour 5=Pop 6=Ornamental (FLINT LIKE) | VA26 |

| 2. REGION WHERE DEVELOPED IN THE U.S.A.: | Standard Seed Source |
|---|---|
| 5 1=Northwest 2=Northcentral 3=Northeast 4=Southeast 5=Southcentral 6=Southwest 7=Other | AMES 19329 |

3. MATURITY (In Region of Best Adaptability; show Heat Unit formula in 'Comments' section)

| DAYS | HEAT UNITS | | DAYS | HEAT UNITS |
|---|---|---|---|---|
| 074 | 1,417.7 | From emergence to 50% of plants in silk | 073 | 1,367.7 |
| 071 | 1,342.0 | From emergence to 50% of plants in pollen | 074 | 1,397.3 |
| 003 | 0,099.0 | From 10% to 90% pollen shed | 002 | 0,059.7 |
| | | From 50% silk to optimum edible quality | | |
| | | From 50% silk to harvest at 25% moisture | | |

4. PLANT:

| | | Standard Deviation | Sample Size | | Standard Deviation | Sample Size |
|---|---|---|---|---|---|---|
| 215.0 | cm Plant Height (to tassel tip) | 19.52 | 03 | 195.0 | 28.83 | 03 |
| 065.7 | cm Ear Height (to base of top ear node) | 13.20 | 03 | 060.7 | 17.90 | 03 |
| 016.8 | cm Length of Top Ear Internode | 00.87 | 03 | 014.6 | 02.27 | 03 |
| 0.0 | Average Number of Tillers | 00.03 | 03 | 0.0 | 00.00 | 03 |
| 0.8 | Average Number of Ears per Stalk | 00.23 | 03 | 1.0 | 00.17 | 03 |
| 1 | Anthocyanin of Brace Roots: 1=Absent 2=Faint 3=Moderate 4=Dark | | | 1 | | |

5. LEAF:

| | | Standard Deviation | Sample Size | | Standard Deviation | Sample Size |
|---|---|---|---|---|---|---|
| 09.1 | cm Width of Ear Node Leaf | 00.31 | 03 | 09.9 | 00.61 | 03 |
| 78.5 | cm Length of Ear Node Leaf | 04.23 | 03 | 75.2 | 05.55 | 03 |
| 06 | Number of leaves above top ear | 00.00 | 03 | 06 | 00.20 | 03 |
| 23 | Degrees Leaf Angle (measure from 2nd leaf above ear at anthesis to stalk above leaf) | 01.40 | 03 | 22 | 03.99 | 03 |
| 03 | Leaf Color (Munsell code) 7.5GY34 | | | 03 | 5GY34 | |
| 1 | Leaf Sheath Pubescence (Rate on scale from 1=none to 9=like peach fuzz) | | | 1 | | |
| | Marginal Waves (Rate on scale from 1=none to 9=many) | | | | | |
| | Longitudinal Creases (Rate on scale from 1=none to 9=many) | | | | | |

6. TASSEL:

| | | Standard Deviation | Sample Size | | Standard Deviation | Sample Size |
|---|---|---|---|---|---|---|
| 06 | Number of Primary Lateral Branches | 01.50 | 03 | 23 | 02.01 | 03 |
| 11 | Branch Angle from Central Spike | 02.78 | 03 | 28 | 09.49 | 03 |
| 62.9 | cm Tassel Length (from top leaf collar to tassel tip) | 04.43 | 03 | 60.5 | 05.41 | 03 |
| 4 | Pollen Shed (rate on scale from 0=male sterile to 9=heavy shed) | | | 7 | | |
| 07 | Anther Color (Munsell code) 7.5Y96 | | | 07 | 10Y88 | |
| 01 | Glume Color (Munsell code) 5GY86 | | | 01 | 5GY58 | |
| 1 | Bar Glumes (Glume Bands): 1=Absent 2=Present | | | 1 | | |

7a. EAR (Unhusked Data):

| | | | | |
|---|---|---|---|---|
| 01 | Silk Color (3 days after emergence) (Munsell code) | 2.5GY86 | 07 | 2.5GY86 |
| 01 | Fresh Husk Color (25 days after 50% silking) (Munsell code) | 5GY68 | 02 | 5GY56 |
| 21 | Dry Husk Color (65 days after 50% silking) (Munsell code) | 5Y92 | 21 | 2.5Y8.52 |
| 1 | Position of Ear at Dry Husk Stage: 1= Upright 2= Horizontal 3= Pendant | | 3 | |
| 5 | Husk Tightness (Rate of Scale from 1=very loose to 9=very tight) | | 5 | |
| 2 | Husk Extension (at harvest): 1=Short (ears exposed) 2=Medium (<8 cm) 3=Long (8-10 cm beyond ear tip) 4=Very Long (>10 cm) | | 3 | |

7b. EAR (Husked Ear Data):

| | | Standard Deviation | Sample Size | Standard Deviation | Sample Size |
|---|---|---|---|---|---|
| 17.0 | cm Ear Length | 01.00 | 03 | 15.0 01.73 | 03 |
| 39.7 | mm Ear Diameter at mid-point | 03.21 | 03 | 42.3 01.53 | 03 |
| 104.0 | gm Ear Weight | 30.51 | 03 | 106.3 15.37 | 03 |
| 14 | Number of Kernel Rows | 00.58 | 03 | 15.3 01.15 | 03 |
| 2 | Kernel Rows: 1=Indistinct 2=Distinct | | | 2 | |
| 2 | Row Alignment: 1=Straight 2=Slightly Curved 3=Spiral | | | 1 | |
| 18.3 | cm Shank Length | 02.52 | 03 | 10.0 01.73 | 03 |
| 2 | Ear Taper: 1=Slight 2= Average 3=Extreme | | | 2 | |

8. KERNEL (Dried)

| | | Standard Deviation | Sample Size | Standard Deviation | Sample Size |
|---|---|---|---|---|---|
| 11.0 | mm Kernel Length | 01.00 | 03 | 10.3 00.58 | 03 |
| 08.7 | mm Kernel Width | 00.58 | 03 | 08.0 00.00 | 03 |
| 04.7 | mm Kernel Thickness | 00.58 | 03 | 05.0 01.00 | 03 |
| 61.3 | % Round Kernels (Shape Grade) | 19.86 | 03 | 50.7 12.06 | 03 |
| 1 | Aleurone Color Pattern: 1-Homozygous 2=Segregating | | | 1 | |
| 19 | Aluerone Color (Munsell code) | | 5Y91 | 07 2.5Y814 | |
| 19 | Hard Endosperm Color (Munsell code) | | 5Y91 | 07 2.5Y814 | |
| JMS 9/20/01 3 ~~10~~ | Endosperm Type: 1=Sweet (Su1) 2=Extra Sweet (sh2) 3=Normal Starch 4=High Amylose Starch 5=Waxy Starch 6=High Protein 7=High Lysine 8=Super Sweet (se) 9=High Oil JMS 9/19/01 10=Other white | | | 3 | |
| 31.7 | gm Weight per 100 Kernels (unsized sample) | 01.53 | 03 | 26.67 02.08 | 03 |

9. COB:

| | | Standard Deviation | Sample Size | Standard Deviation | Sample Size |
|---|---|---|---|---|---|
| 24.0 | mm Cob Diameter at mid-point | 00.00 | 03 | 25.7 00.58 | 03 |
| 19 | Cob Color (Munsell code) 5Y91 | | | 19 2.5Y92 | |



1C

10. DISEASE RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); leave blank if not tested; leave Race or Strain Options blank if polygenic):

| | | |
|---|---|---|
| | **A. Leaf Blights, Wilts, and Local Infection Diseases** | |
| | Anthracnose Leaf Blight (Colletotrichum graminicola) | |
| | Common Rust (Puccinia sorghi) | |
| | Common Smut (Ustilago maydis) | |
| | Eyespot (Kabatiella zeae) | |
| | Goss's Wilt (Clavibacter michiganense spp. nebraskense) | |
| 6 | Gray Leaf Spot (Cercospora zeae-maydis) | 3 |
| | Helminthosporium Leaf Spot (Bipolaris zeicola) Race ——— | |
| 1 | Northern Leaf Blight (Exserohilum turcicum) Race ——— | 1 |
| 7 | Southern Leaf Blight (Bipolaris maydis) Race ——— | 5 |
| | Southern Rust (Puccinia polysora) | |
| 6 | Stewart's Wilt (Erwinia stewartii) | 4 |
| | Other (Specify) ——— | |
| | **B. Systemic Diseases** | |
| | Corn Lethal Necrosis (MCMV and MDMV) | |
| 9 | Head Smut (Sphacelotheca reiliana) | 9 |
| | Maize Chlorotic Dwarf Virus (MDV) | |
| | Maize Chlorotic Mottle Virus (MCMV) | |
| 4 | Maize Dwarf Mosaic Virus (MDMV) | 3 |
| | Sorghum Downy Mildew of Corn (Peronosclerospora sorghi) | |
| | Other (Specify) ——— | |
| | **C. Stalk Rots** | |
| 4 | Anthracnose Stalk Rot (Colletotrichum graminicola) | 3 |
| | Diplodia Stalk Rot (Stenocarpella maydis) | |
| | Fusarium Stalk Rot (Fusarium moniliforme) | |
| | Gibberella Stalk Rot (Gibberella zeae) | |
| | Other (Specify) ——— | |
| | **D. Ear and Kernel Rots** | |
| | Aspergillus Ear and Kernel Rot (Aspergillus flavus) | |
| 3 | Diplodia Ear Rot (Stenocarpella maydis) | 2 |
| 5 | Fusarium Ear and Kernel Rot (Fusarium moniliforme) | 6 |
| | Gibberella Ear Rot (Gibberella zeae) | |
| | Other (Specify) ——— | |

11. INSECT RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); (leave blank if not tested) :

| | |
|---|---|
| Banks grass Mite (Oligonychus pratensis) | |
| Corn Worm (Helicoverpa zea) | |
| Leaf Feeding | |
| Silk Feeding | |
| mg larval wt. | |
| Ear Damage | |
| Corn Leaf Aphid (Rhopalosiphum maidis) | |
| Corn Sap Beetle (Carpophilus dimidiatus | |
| European Corn Borer (Ostrinia nubilalis) | |
| 1st Generation (Typically Whorl Leaf Feeding) | |
| 2nd Generation (Typically Leaf Sheath-Collar Feeding) | |
| Stalk Tunneling | |
| cm tunneled/plant | |
| Fall Armyworm (Spodoptera fruqiperda) | |
| Leaf Feeding | |
| Silk Feeding | |
| mg larval wt. | |
| Maize Weevil (Sitophilus zeamaize | |
| Northern Rootworm (Diabrotica barberi) | |
| Southern Rootworm (Diabrotica undecimpunctata) | |
| Southwestern Corn Borer (Diatreaea grandiosella) | |
| Leaf Feeding | |
| Stalk Tunneling | |
| cm tunneled/plant | |
| Two-spotted Spider Mite (Tetranychus urticae) | |
| Western Rootworm (Diabrotica virgifrea virgifera) | |
| Other (Specify) ——— | |

| | |
|---|---|
| 12. AGRONOMIC TRAITS: | |
| 4 Staygreen (at 65 days after anthesis) (Rate on a scale from 1=worst to excellent) | 3 |
| % Dropped Ears (at 65 days after anthesis) | |
| % Pre-anthesis Brittle Snapping | |
| % Pre-anthesis Root Lodging | |
| Post-anthesis Root Lodging (at 65 days after anthesis) | |
| Kg/ha Yield of Inbred Per Se (at 12-13% grain moisture) | |

13. MOLECULAR MARKERS: (0=data unavailable; 1=data available but not supplied; 2=data supplied):

1 Isozymes 0 RFLP's 0 RAPD's

COMMENTS (eg. state how heat units were calculated, standard inbred seed source, and/or where data was collected. Continue in Exhibit D):

# CLARIFICATION OF DATA IN EXHIBITS B AND C

Please note the data presented in Exhibit C, "Objective Description of Variety," are collected primarily at Johnston and Ankeny, Iowa. The data in Exhibit B are from comparisons of inbreds grown in the same tests in the adapted growing area of PH5D6 and in Johnston and Ankeny, IA. The data in Tables 1A and 1B are from paired comparisons collected in Johnston and Ankeny, IA. The data in Table 2 are from paired comparisons grown primarily in the adapted growing area of PH5D6. These traits collectively show distinct differences between the two varieties.

The data collected in exhibit C were collected in 1994 and 1996 for page 1 and 2. There are environmental factors that differ from environment to environment. The environments had different planting dates within each year. Environmental temperature and precipitation differences during the vegetative and grain fill periods can impact plant and grain traits and be a source of variability. These data are mostly based on 5 plants measured at each location. There often is more variability associated with year to year or location to location factors than within locations. Please see Table 3 for average temperature and rainfall information in 1994 and 1996.

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**Table 3. Temperature and Rainfall**

TEMPERATURE

| YEAR | MAY | JUN | JULY | AUG | AVERAGE |
|---|---|---|---|---|---|
| **1994** | 59.8 | 70.7 | 71.9 | 69.0 | **67.9** |
| **1995** | 56.2 | 69.4 | 74.3 | 76.9 | **69.2** |
| **1996** | 56.2 | 69.3 | 71.3 | 70.5 | **66.8** |
| **1997** | 53.5 | 70.6 | 74.1 | 69.6 | **67.0** |
| **1998** | 64.7 | 66.6 | 74.8 | 73.5 | **69.9** |
| **1999** | 60.7 | 69.7 | 78.7 | 70.5 | **69.9** |

RAINFALL

| YEAR | MAY | JUN | JULY | AUG | Total |
|---|---|---|---|---|---|
| **1994** | 3.67 | 5.75 | 1.71 | 4.18 | **15.31** |
| **1995** | 5.04 | 4.19 | 2.94 | 2.87 | **15.04** |
| **1996** | 8.47 | 4.35 | 2.51 | 2.14 | **17.47** |
| **1997** | 4.32 | 3.27 | 4.10 | 1.36 | **13.05** |
| **1998** | 6.46 | 11.07 | 5.70 | 4.96 | **28.19** |
| **1999** | 6.46 | 4.54 | 4.45 | 6.55 | **21.85** |

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

# EXHIBIT E
# STATEMENT OF THE BASIS OF OWNERSHIP

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

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

| 1. NAME OF APPLICANT(S) | 2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER | 3. VARIETY NAME |
|---|---|---|
| **PIONEER HI-BRED INTERNATIONAL, INC.** | | **PH5D6** |

| 4 .ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)* | 5. TELEPHONE *(include area code)* | 6. FAX *(include area code)* |
|---|---|---|
| **7301 NW 62nd AVENUE**<br>**P.O.BOX 85**<br>**JOHNSTON, IA 50131-0085** | **515-270-4051** | **515-253-2125** |
| | 7. PVPO NUMBER 200000198 | |

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

9. Is the applicant (individual or company) a U.S. national or U.S. based company? ☒ YES ☐ NO

**If no, give name of country**

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

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

☐ YES ☐ NO ***if no, give name of country***

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

☒ YES ☐ NO ***If no, give name of country***

11. Additional explanation on ownership *(if needed, use reverse for extra space)*:

PH5D6 is owned by Pioneer Hi-Bred International, Inc.

**PLEASE NOTE:**

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

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country Which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

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

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

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