No. 8800157

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 (7 U.S.C. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

ALFALFA

'5331'

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* August *in the year of our Lord one thousand nine hundred and* eighty-eight.

Attest:

Kenneth A. Evans

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Richard E. Lyng

Secretary of Agriculture

APPROVAL EXPIRES 4-30-85

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: XAR53

3. VARIETY NAME: 5331

4. ADDRESS *(Street and No. or R.F.D. No., City, State, and Zip Code)*: 7305 N. W. 62nd Avenue, P. O. Box 287 Johnston, IA 50131

5. PHONE *(Include area code)*: 515-270-3340

FOR OFFICIAL USE ONLY

PVPO NUMBER: 8800157

6. GENUS AND SPECIES NAME: Medicago sativa

7. FAMILY NAME *(Botanical)*: Leguminosae

FILING — DATE: May 23, 1988 — TIME: 9:30 ☑ A.M. ☐ P.M

8. KIND NAME: Alfalfa

9. DATE OF DETERMINATION: August, 1985

FEES RECEIVED — AMOUNT FOR FILING: $ 1800.00 — DATE: May 23, 1988 — AMOUNT FOR CERTIFICATE: $ 200.00 — DATE: July 22, 1988

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

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

William T. W. Woodward, 7305 N. W. 62nd Avenue, P. O. Box 287, Johnston, IA, 50131
Jerry Chicoine, 700 Capital Square, 400 Locust Street, Des Moines, IA 50309

PHONE *(Include area code)*.

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED

a. ☒ Exhibit A. Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
b. ☒ Exhibit B. Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety *(Request form from Plant Variety Protection Office.)*
d. ☒ Exhibit D. Additional Description of Variety.
e. ☒ 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.)* ☐ Yes *(If "Yes," answer items 16 and 17 below)* ☒ No

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," give date)* ☒ No

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

U. S. A. Spring of 1988

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: 5/16/88

SIGNATURE OF APPLICANT: BY: William T. W. Woodward — DATE: 5/16/88

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FORM WA-470 (7-84) (Edition of 3-84 is obsolete.)

EXHIBIT A

ORIGIN AND BREEDING HISTORY OF THE VARIETY

'5331'

5331 is a synthetic variety comprised from 200 plants originating from experimental lines tracing to NCMP10 (41%), Saranac (10%), Vernal (8%), DuPuits, 530, Alfa, Flemish (6% each), Titan, Valor, MnP-B1 (4% each), and 5% unknown. Parent plants were selected through recurrent phenotypic selection and trace to various experimental populations selected for one or more of the following: Bacterial wilt, anthracnose, phytophthora root rot, and winter survival.

Syn I seed harvested from parental plants in 1983 and 1984 in cage isolation was bulked and considered breeder seed.

During seed multiplication no variates beyond the limits defined under Exhibit C have been found. Multiplication procedures will insure that seed being sold as 5331 will not be shifted in characteristics beyond presently acceptable limits for alfalfa varieties.

It is confirmed that 5331 meets presently acceptable levels for uniformity for alfalfa varieties.

EXHIBIT B

NOVELTY STATEMENT

'5331'

5331 most closely resembles the variety '629'. 5331 differs from 629 in anthracnose (race 1) resistance, being as resistant as 'Arc', while 629 has low resistance to the disease. 5331 and 629 score 68.3% and 5.8% resistant plants, respectively, when Arc scores 66.5% resistant plants (Attachment II, Exhibit D).

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

Exhibit
(APR

OBJECTIVE DESCRIPTION OF VARIETY

ALFALFA *(Medicago sativa* sensu Gunn et al.*)*

NAME OF APPLICANT(S)	TEMPORARY DESIGNATION	VARIETY NAME
Pioneer Hi-Bred International, Inc.	XAR53	5331

ADDRESS *(Street and No., or R.F.D. No., City, State, and Zip Code)*
7305 N. W. 62nd Avenue
P. O. Box 287
Johnston, IA 50131

FOR OFFICIAL USE ONLY
PVPO NUMBER
8800157

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place numbers in the boxes to designate the expressions which are characteristic of the commerical generations of t application variety. Data for quantitative plant characters should be based on a minimum of 100 plants. Include leading zeros when necessary (e.g., [0|8|9]) for quan titative data. Comparative data should be determined from varieties entered in the same trial. Plant color may be precisely designated by using any recognized color chart, e.g., The Munsell Plant Tissue Color Charts.

1. WINTERHARDINESS:

[6] CLASS:

1 = Very Non-Winterhardy (CUF 101)
2 = Non-Winterhardy (Moapa 69)
3 = Intermediately Non-Winterhardy (Mesilla)
4 = Semi-Winterhardy (Lahontan)
5 = (Du Puits)
6 = Moderately Winterhardy (Saranac)
7 = (Ranger)
8 = Winterhardy (Vernal)
9 = Extremely Winterhardy (Norseman)

TEST LOCATION: Owatonna, MN

2. FALL DORMANCY:

FALL DORMANCY (DETERMINED FROM SPACED PLANTINGS)

TESTING INSTITUTION AND LOCATION	DATE OF LAST CUT	DATE REGROWTH SCORED	REGROWTH SCORE OR AVERAGE HEIGHT: APPLICATION VARIETY	CHECK VARIETIES*: Vernal	Ranger	Saranac	LSD .05
Pioneer Hi-Bred Int'l Inc	9/2/86	10/1/86	30.6	24.0	27.4	28.9	1.6
Owatonna, MN	8/28/85	10/2/85	34.3	26.3	30.2	32.0	1.9
Pioneer Hi-Bred Int'l Inc	9/15/86	10/16/86	18.0	11.0	–	19.0	4.7
Moses Lake, WA	9/15/86	10/16/86	24.0	13.0	–	22.0	4.8

* CUF 101, Moapa 69, Mesilla, Lahontan, Du Puits, Saranac, Ranger, Vernal, or Norseman as appropriate.

Specify scoring system used Owatonna-average height in cm of space plants; Moses Lake-average height of plot in cm.

[5] Fall Growth Habit (Determined from Fall Dormancy Trials)

1 = Erect (CUF 101)
3 = Semierect (Mesilla)
5 = Intermediate (Saranac)
7 = Semidecumbent (Vernal)
9 = Decumbent (Norseman)

3. RECOVERY AFTER FIRST SPRING CUT (In Southwest, first cut after March 21):

[3]

1 = Very Fast (CUF 101)
3 = Fast (Saranac)
5 = Intermediate (Ranger)
7 = Slow (Vernal)
9 = Very Slow (Norseman)

TEST LOCATION: Owatonna, MN; Johnston, IA

4. AREAS OF ADAPTATION IN U.S. (Where tested and proven adapted):

[2] Primary Area of Adaptation

[1] [6] Other Areas of Adaptation

1 = North Central
2 = East Central
3 = Southeast
4 = Southwest
5 = Moderately Winterhardy Intermountain
6 = Winterhardy Intermountain
7 = Great Plains
8 = Other *(Specify)* _____

5. FLOWERING DATE (When 10% of plants possess open flowers at time of first spring cut):

[ ][ ] Days Earlier Than . . . . . [ ]

Same As . . . . . [ ]

[ ][ ] Days Later Than . . . . . [ ]

1 = CUF 101
2 = Mesilla
3 = Saranac
4 = Vernal
5 = Norseman

TEST LOCATION: _____

8800157

6. PLANT COLOR (Determined from healthy regrowth 3 weeks after first spring cut, controlling leafhoppers if necessary)

[ ] 1 = Very Dark Green (524) 2 = Dark Green (Vernal) 3 = Light Green (Ranger)

COLOR CHART VALUE (Specify chart used): _____)

APPLICATION VARIETY _____

VERNAL: _____

TEST LOCATION: _____

7. CROWN TYPE (Determined from spaced plantings):

[2] Noncreeping Types: 1 = Broad (Vernal) 2 = Intermediate (Saranac) 3 = Narrow (CUF 101)

Creeping Types 4 = Creeping Rooted (Rangelander) 5 = Rhizomatous (Rhizoma)

8. FLOWER COLOR (Determine frequency of plants for each color class as defined by USDA Agricultural Handbook No. 424 (Barnes 1972), allowing all plants in plot to flower):

[ ][8][6] % Purple and Violet (Subclasses 1.1 to 1.4)

[ ][ ][9] % Variegated Other Than Blue (Subclasses 2.1, 2.2, 2.5 to 2.9)

[ ][ ][T] % Cream (Class 3)

[ ][ ][5] % Blue (Subclasses 2.3 and 2.4)

[ ][ ][T] % Yellow (Subclasses 4.1 to 4.4)

[ ][ ][T] % White (Class 5)

TEST LOCATION: Connell, WA T=Trace or <1%

9. POD SHAPE (Determine frequency of plants with the following pod shapes produced on well cross-pollinated racemes):

[ ][ ][ ] % Tightly Coiled (One or more coils, center more or less closed)

[ ][ ][ ] % Sickle (Less than 1 coil)

[ ][ ][ ] % Loosely Coiled (One or more coils, center conspicuously open)

TEST LOCATION: _____

10. PEST RESISTANCE: Provide in the appropriate column, trial data for application variety, and resistant (R) and susceptible (S) check varieties, synthetic generation tested, average severity index scores (ASI), least significant difference statistics (LSD .05), the institution in charge of test, year, and location of test, and whether test is a field or laboratory evaluation. Describe scoring system, and any test procedure which differs from standard methods proposed by Elgin (1982). Trial data from other test years or locations should be presented whenever available on a separate document as Exhibit D.
Seeds of the check varieties and germplasm lines listed below can be obtained from the USDA Field Crops Laboratory, Bldg. 001, Rm. 335, BARC-West, Beltsville, MD 20705. Although comparisons with check varieties listed below are preferred, comparisons with any appropriate check variety recommended by Elgin (1982) may be presented.

A. DISEASE RESISTANCE:

DISEASE	VARIETY	SYN. GEN. TESTED	PERCENT RESISTANT PLANTS	NUMBER OF PLANTS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Anthracnose, Race 1 (*Colletotrichum trifolii*)	Application	2	74.0	200	–	LSD .05 % Res. 7.1	University of Wisconsin, Madison, WI 1986 Laboratory
	Arc (R)		68.0	200	–		
	Saranac (S)		0.3	200			
	SCORING SYSTEM: Percent surviving plants						
Anthracnose, Race 2 (*Collectotrichum trifolii*)	Application	2	12.08	300	–	LSD .05 % Res. 5.69	Pioneer Hi-Bred International, Inc. Quarryville, PA 1987 Laboratory
	Saranac AR (R)		29.38	300	–		
	Arc (S)		1.35	300	–		
	SCORING SYSTEM: Percent surviving plants						
Bacterial Wilt (*Corynebacterium insidiosum*)	Application	2	54.47	225	1.62	LSD .05 ASI 0.38	University of Minnesota, Rosemount, MN 1986 Field
	Vernal (R)		31.00	225	2.35		
	Narragansett (S)		3.97	225	3.56		
	SCORING SYSTEM: Plants scored 0 and 1 (on a 0-5 scale, where 0=no disease and 5=dead plant) considered resistant.						
Common Leafspot (*Pseudopeziza medicaginis*)	Application						
	MSA-CW3AN3 (R)						
	Ranger (S)						
	SCORING SYSTEM:						

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DISEASE	VARIETY	TESTED	PLANTS	PLANTS TESTED	ASI	LSD .05	FIELD OR LABORATORY
Downy Mildew (*Peronospora trifoliorum*)	Application						
Isolate, if known:	Saranac (R)						
	Kanza (S)						
	SCORING SYSTEM:						
Fusarium Wilt (*Fusarium oxysporum f. medicaginis*)	Application	1	53.38	225	2.24	LSD .05 ASI 0.57	University of Minnesota Rosemount, MN 1986 Field
	~~[illegible]~~ Agate		48.97	225	2.65		
	Narragansett (R)		23.25	225	3.70		
	SCORING SYSTEM: Plants scored 0 and 1 (on a 0-5 scale, where 0=no disease and 5=dead plant) considered resistant.						
Phytophthora Root Rot (*Phytophthora megasperma f. medicaginis*)	Application	2	58.06	225	3.03	LSD .05 ASI 0.75	University of Minnesota Rosemount, MN 1987 Field
	Agate (R)		56.52	225	2.90		
	Saranac (S)		21.93	225	4.42		
	SCORING SYSTEM: Plants scored 1 and 2 (on a 1-6 scale, where 1=no disease and and 6=dead plant) considered resistant.						
Verticillium Wilt (*Verticillium albo-atrum*)	Application	2	10.0		–	LSD .05 % Res. 6.98	USDA-ARS Prosser, WA 1987 Laboratory
	Vertus (R)		26.7		–		
	Saranac (S)		1.0		–		
	SCORING SYSTEM: Plants scored 1 and 2 (on a 1-5 scale, where 1=no disease and 5=dead plant) considered resistant.						
Other (*Specify*)	Application						
	(R)						
	(S)						
	SCORING SYSTEM:						
Other (*Specify*)	Application						
	(R)						
	(S)						
	SCORING SYSTEM:						

B. INSECT RESISTANCE:

INSECT	VARIETY	SYN. GEN. TESTED	PERCENT DEFOLIATION	DEFOLIATION IN PERCENT OF RESISTANT CHECK	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Alfalfa Weevil (*Hypera postica*)	Application						
	Arc (R)			100			
	Saranac (S)						
	SCORING SYSTEM:						

10. B. INSECT RESISTANCE (Continued):

INSECT	VARIETY	SYN. GEN. TESTED	PERCENT SEEDLING SURVIVAL	NUMBER OF SEEDLINGS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Blue Alfalfa Aphid *(Acyrthosiphon kondoi)*	Application	2	0.0	300	2.1	LSD .05 % Res. 3.7 ASI 0.25	Pioneer Hi-Bred International, Inc. Johnston, IA 1987 Laboratory
	CUF 101 (R)		63.8	300	5.2		
	PA-1 (S)		0.0	300	2.6		
	SCORING SYSTEM: Plants scored 5-9 (on a 1-9 scale, where 9=no stunting and 1=dead) considered resistant.						
Pea Aphid *(Acyrthosiphon pisum)*	Application	2	18.7	300	3.1	LSD .05 % Res. 11.7 ASI 0.48	Pioneer Hi-Bred International, Inc. Johnston, IA 1987 Laboratory
	Kenza (R)		15.7	300	2.9		
	Ranger (S)		5.6	300	2.3		
	SCORING SYSTEM: Plants scored 5-9 (on a 1-9 scale, where 9=no stunting and 1=dead) considered resistant.						
Spotted Alfalfa Aphid *(Therioaphis maculata)* *Biotype, if known:*	Application	2	13.9	Over 200	1.9	LSD .05 % Res. 9.4 ASI 0.53	Pioneer Hi-Bred International, Inc. Kerman, CA 1987 Laboratory
	~~Kenza (R)~~ Baker		21.5	Over 200	2.5		
	Ranger (S)		3.9	Over 200	1.2		
	SCORING SYSTEM: Plants scored 5-9 (on a 1-9 scale, where 9=no symptoms and 1=dead or severe stunting) considered resistant.						

INSECT	VARIETY	SYN. GEN. TESTED	PERCENT RESISTANT PLANTS	NUMBER OF PLANTS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Potato Leafhopper Yellowing *(Empoasca fabae)*	Application						
	MSA-CW3An3 (R)						
	Ranger (S)						
	SCORING SYSTEM:						
Other *(Specify)*	Application						
	(R)						
	(S)						
	SCORING SYSTEM:						

C. NEMATODE RESISTANCE:

NEMATODE	VARIETY	SYN. GEN. TESTED	PERCENT RESISTANT PLANTS	NUMBER OF PLANTS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Northern Root Knot *(Meloidogyne hapla)*	Application						
	Nev. Syn. XX (R)						
	Lahontan (S)						
	SCORING SYSTEM:						

10. C. NEMATODE RESISTANCE (Continued):

NEMATODE	VARIETY	SYN. GEN. TESTED	PERCENT RESISTANT PLANTS	NUMBER OF PLANTS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Southern Root Knot (*Meloidogyne incognita*)	Application						
	Moapa 69 (R)						
	Lahontan (S)						
	SCORING SYSTEM:						
Stem Nematode (*Ditylenchus dipsaci*)	Application	1	23.7	Over 200	2.97	LSD .05 % Res. 12.5 ASI 0.68	Pioneer Hi-Bred International, Inc. Connell, WA 1986 Laboratory
	Lahontan (R)		49.2	Over 200	3.66		
	Ranger (S)		17.1	Over 200	2.45		
	SCORING SYSTEM: Plants scored 7-9 (on a 1-9 scale, where 9=no disease, and 1=dead plant) considered resistant.						
Other (*Specify*)	Application						
	(R)						
	(S)						
	SCORING SYSTEM:						

11. INDICATE THE VARIETY THAT MOST CLOSELY RESEMBLES THE APPLICATION VARIETY FOR EACH OF THE FOLLOWING CHARACTERS:

CHARACTER	VARIETY	CHARACTER	VARIETY
Winterhardiness	Saranac	Plant Color	- -
Recovery After 1st Cut	5444	Crown Type	5444
Area of Adaptation	Saranac	Combined Disease Resistance	629
Flowering Date	- -	Combined Insect Resistance	Kanza

REFERENCES

Barnes, D.K. 1972. A System for Visually Classifying Alfalfa Flower Color. U.S. Dep. Agric. Handb. 424. 18 pp. (Note: Greenish cast of plate 6, A and B is an artifact of printing, actual colors a blend of yellow and white.)

Elgin, J.H., Jr., (ed.). 1982. Standard Tests to Characterize Pest Resistance in Alfalfa Cultivars. U.S. Dep. Agric. Tech. Bull. (In Press).

Gunn, C.R., W.H. Skrdla, and H.C. Spencer. 1978. Classification of Medicago sativa L. using legume characters and flower colors. U.S. Dep. Agric. Tech. Bull. 1574. 84 pp.

Munsell Color Co. 1977. Munsell Plant Tissue Color Charts. Munsell Color Co., Inc. Baltimore.

NOTE: Any additional descriptive information and supporting documentation may be provided as Exhibit D.

8800157

EXHIBIT D

ADDITIONAL DESCRIPTION OF VARIETY

'5331'

1. 5331 is a 200 plant synthetic with parents originating from several experimental lines tracing to NCMP10, Saranac, Vernal, DuPuits, 530, Alfa, Flemish, Titan, Valor, MnP-B1 and other germplasms with minor contributions. Parent plants were selected for one or more of the following: bacterial wilt, anthracnose, Phytophthora, and winter survival.

2. 5331 is a winterhardy cultivar adapted to the central and northern regions of the United States for hay, haylage, greenchop and dehydration. The states in which 5331 have been tested are: Iowa, Minnesota, Indiana, Michigan, New York, Pennsylvania, Maryland, Oregon, Washington, Illinois, and Wisconsin.

3. Flower color of the Syn 2 generation is approximately 86% purple and violet, 9% variegated other than blue, 5% blue, and a trace of white, cream, and yellow. Growth habit is erect in mid summer and semi-erect in the fall. It is a moderately fall dormant similar to Saranac.

4. 5331 has high resistance to anthracnose (Race 1), bacterial wilt, and Fusarium wilt; resistance to Phytophthora root rot; moderate resistance to anthracnose (Race 2), pea aphid, stem nematode, and spotted alfalfa aphid; low resistance to Verticillium wilt. Resistance to blue aphid has not been adequately determined.

5. Breeder seed (Syn 1) was produced on parent plants in "cage isolation" and bulked to provide sufficient quantities for life of variety. Seed classes will be breeder, foundation, and certified. Foundation seed may be produced from breeder or foundation. The second generation foundation may be produced at the discretion of Pioneer Hi-Bred International, Inc. A maximum of 3 consecutive harvest years is permitted on stands producing foundation seed with 5 consecutive harvest years maximum on stand producing certified seed.

6. Seed will be marketed in the spring of 1988.

7. Application for Plant Variety Protection will be made and the certification option will not be requested.

8. As a means of added varietal protection, information included in the Application for Review of Alfalfa Varieties for Certification may be provided to the PVP office.

Substituted Date: 6/9/88, AB

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EXHIBIT D
ATTACHMENT II

PIONEER HI-BRED INTERNATIONAL, INC.
JOHNSTON, IA
1988
LABORATORY EXPERIMENT

ANTHRACNOSE (race 1) - JH 1988

VARIETY	% RES
5331	68.3
ADMIRAL	4.0
ADVANTAGE	11.4
AGATE	0.0
APOLLO	0.0
APOLLO II	3.1
ARC	66.5
ARMOR	17.1
ARROW	16.5
CIMARRON	21.3
COMMANDOR	40.2
DART	26.7
DIAMOND	7.5
DK 120	0.0
DRUMMOR	4.9
DUKE	7.0
DYNASTY	17.3
EDGE	42.3
ELEVATION	0.0
ENDURE	10.2
EPIC	0.0
EXCALIBUR	12.8
EXPO	16.1
629	5.8
630	5.3
HI PHY	0.0
HUSKY	10.2
IMPACT	20.4
JUBILEE	13.2
KINGSTAR	4.1
MAGNUM	3.1
MAXIM	11.7
MERCURY	7.4
MILKMAKER	3.6
ONEIDA VR	5.3
PRESERVE	3.8
RANGER	0.0
RESISTADOR II	0.8
S.SPECIAL	2.7
SALUTE	1.8

VARIETY	% RES
SARANAC	0.0
SARANAC AR	39.6
SPARTA	0.6
SPECTRUM	0.0
SUMMIT	44.0
TEAM	7.5
TRUMPETOR	18.7
ULTRA	50.9
VALOR	1.8
VANCOR	27.4
VERNAL	0.6
VERNEMA	0.0
VERTUS	19.6
WL 221	0.0
WL 303	0.0
WL 304	0.0
WL 309	0.0
WL 311	1.1
WL 312	1.8
WL 313	0.6
WL 316	37.5
WL 318	0.0
WL 320	12.2
WL 516	0.0
WRANGLER	0.0
XAF62	0.0
XAR64	7.9
YAL72	5.6
YAM71	66.8
YAM73	67.3
YAS61	0.0
MEAN	12.7
cv	29
LSD.05	7.2

Exhibit E

STATEMENT OF THE BASIS OF APPLICANT'S OWNERSHIP

'5331'

Pioneer Hi-Bred International, Inc., Des Moines, Iowa, is the employer of the plant breeders involved in the development and evaluation of 5331. Pioneer Hi-Bred International, Inc. has the sole rights and ownership of 5331.