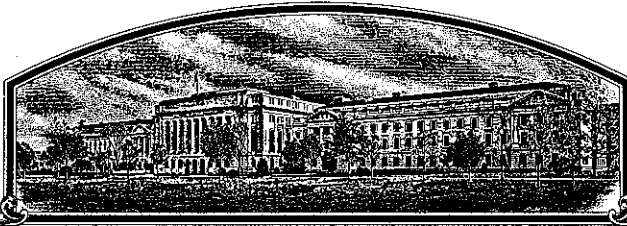


No.

9100147



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

**W - H Research, 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 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

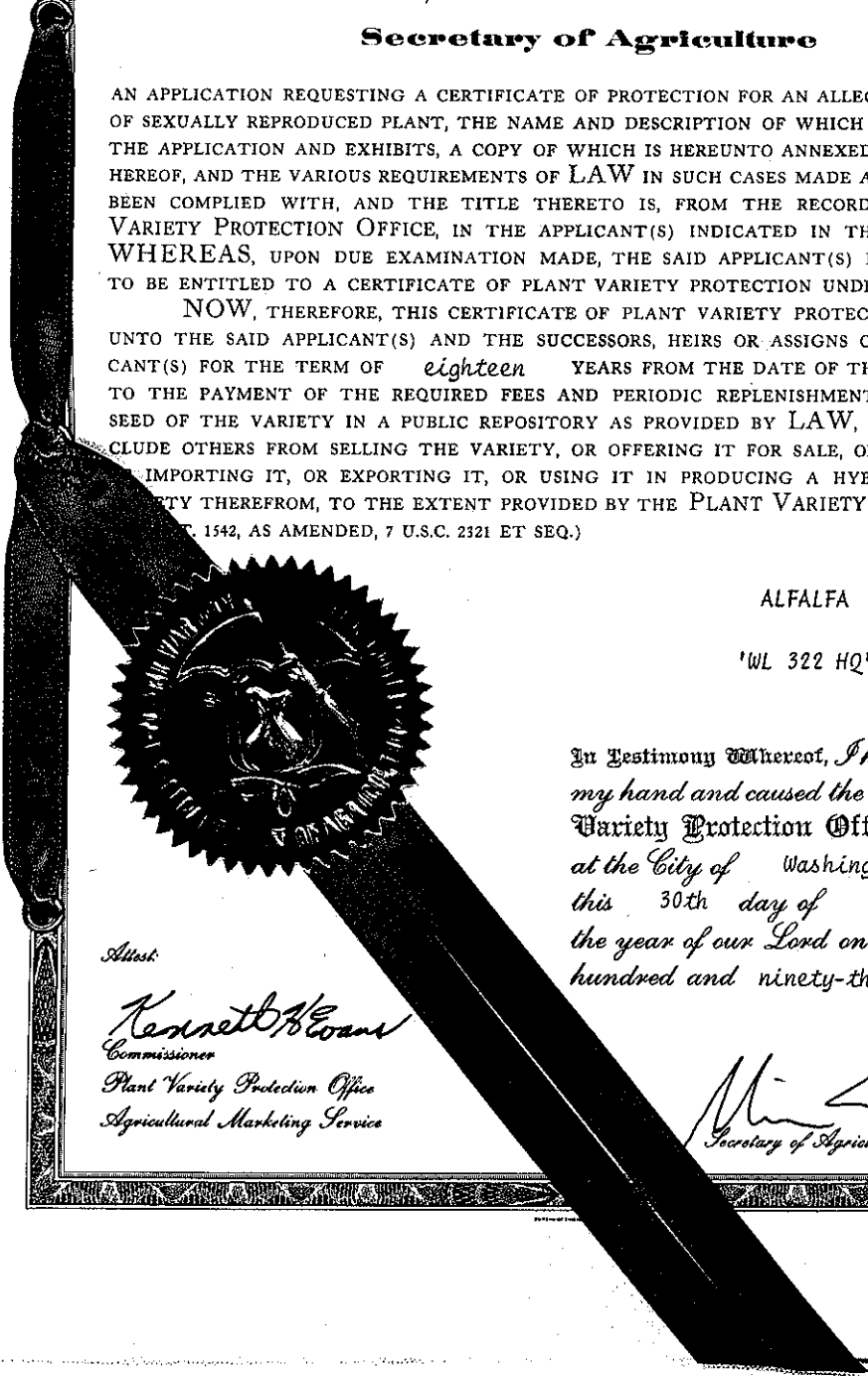
'WL 322 HQ'

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 July in the year of our Lord one thousand nine hundred and ninety-three.

Attest:

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

*[Signature]*  
Secretary of Agriculture

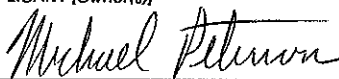


U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE

# 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)  W-L Research, Inc.		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.  88-6	3. VARIETY NAME  WL 322 HQ
4. ADDRESS (street and no. or R.F.D. no., city, state, and ZIP)  2000 Oak Street Bakersfield, CA 93301		5. PHONE (include area code)  (805) 327-4491	
6. GENUS AND SPECIES NAME  Medicago sativa L.		7. FAMILY NAME (Botanical)  Leguminosae	
8. CROP KIND NAME (Common Name)  Alfalfa		9. DATE OF DETERMINATION  Nov. 1, 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  California		12. DATE OF INCORPORATION  June 30, 1988	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS M. A. Peterson, Director of Research W-L Research, Inc. 8701 Hwy. 14 Evansville, WI 53536			
			PHONE (include area code): (608) 882-4100
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow INSTRUCTIONS on reverse)			
a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety.			
b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement.			
c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of Variety.			
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.			
f. <input checked="" type="checkbox"/> Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office <u>March 19, 1991</u>			
g. <input checked="" type="checkbox"/> 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.) <input type="checkbox"/> YES (If "YES," answer items 16 and 17 below) <input checked="" type="checkbox"/> NO (If "NO," skip to item 18 below)			
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," through <input type="checkbox"/> Plant Variety Protection Act <input type="checkbox"/> Patent Act. Give date: _____ ) <input checked="" type="checkbox"/> NO			
19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?  <input checked="" type="checkbox"/> YES (If "YES," give names of countries and dates)      Limited quantities of commercial seed were offered for sale in the United States in January 1991. <input 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 [Owner(s)]  		CAPACITY OR TITLE Vice President/Director of Research	DATE March 19, 1991
SIGNATURE OF APPLICANT [Owner(s)]		CAPACITY OR TITLE	DATE

FOR OFFICIAL USE ONLY	
PVPO NUMBER	
9100147	
F I L I N G	Date <u>March 25, 1991</u> Time <input checked="" type="checkbox"/> A.M. <input type="checkbox"/> P.M.
F E E S	Filing and Examination Fee: \$ <u>2150.00</u> Date <u>March 25, 1991</u>
R E C E I V E D	Certificate Fee: \$ <u>250.00</u> Date <u>July 19, 1993</u>

## Exhibit A

### Origin and Breeding History of WL 322 HQ

WL 322 HQ is a synthetic variety composed of 147 plants selected for high forage quality (high crude protein, low acid and neutral detergent fibers) using NIR spectroscopy. Source material traces to 22 clones derived from 18 experimental breeding lines that had been selected for resistance to bacterial wilt, Fusarium wilt, phytophthora root rot, and tolerance to potato leafhopper yellowing in field nurseries. Subsequent selection was performed for resistance to verticillium wilt. Parental germplasm traces to Vernal (15%); Saranac (20%); Kanza (25%); Atlantic (20%); WL 305 (10%), and WL 309 (10%). The 147 parental selections were grown in an isolation cage at Warden, WA. Breeder (Syn 1) seed was harvested in 1988.

Approximate germplasm source contributions are; *M. falcata* - 6%, Ladak - 9%, *M. varia* - 32%, Turkistan - 7%, Flemish - 31%, Chilean - 14%, and Peruvian - 1%.

### Type and Frequency of Variants

No variants are recognized in WL 322 HQ beyond the limits given in Exhibit C.

### Evidence of Uniformity and Stability

WL 322 HQ is stable in all essential and distinguishing characteristics (e.g. flower color) during normal seed production. WL 322 HQ is as uniform as other alfalfa varieties previously accepted by state seed certification programs.

**Exhibit B****Novelty Statement for WL 322 HQ**

WL 322 HQ is a semi-dormant variety that possesses superior forage quality and disease, insect, and nematode resistance when compared to most varieties with similar adaptation. \* WL 322 HQ is most similar to WL 320 in growth type, appearance, and pest resistance. However, WL 322 HQ is highly resistant to bacterial wilt (WL 320 = R, Table 1), and is resistant to verticillium wilt (WL 320 = MR, Table 2). WL 322 HQ is also similar to Oneida VR. However, WL 322 HQ is resistant to verticillium wilt (Oneida VR = HR, Table 2), and is resistant to phytophthora root rot (Oneida VR = MR, Table 3). WL 322 HQ is also similar to Apollo Supreme. However, WL 322 HQ is moderately resistant to anthracnose (Apollo Supreme = HR, Table 4), and WL 322 HQ is highly resistant to spotted alfalfa aphid (Apollo Supreme = S, Table 5). WL 322 HQ is also similar to Magnum III. However, WL 322 HQ is highly resistant to spotted alfalfa aphid (Magnum III = MR, Table 5). WL 322 HQ is also similar to Pioneer 5432. However, WL 322 HQ is resistant to phytophthora root rot (Pioneer 5432 = MR, Table 6). WL 322 HQ is also similar to Arrow. However, WL 322 HQ is a Saranac (4) type dormancy (Arrow = Ranger (3), Table 7). WL 322 HQ is also similar to Fortress. However, WL 322 HQ is moderately resistant to anthracnose (Fortress = R, Table 4).

WL 322 HQ is most similar to

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

EXHIBIT C  
 (Alfalfa)

OBJECTIVE DESCRIPTION OF VARIETY  
 ALFALFA (*Medicago sativa* sensu Gunn et al.)

NAME OF APPLICANT(S) W-L Research, Inc.	TEMPORARY DESIGNATION 88-6	VARIETY NAME WL 322 HQ
ADDRESS (Street and No., or R.F.D. No., City, State, and Zip Code) 2000 Oak Street Bakersfield, CA 93301		FOR OFFICIAL USE ONLY PVPO NUMBER 9100147

PLEASE READ ALL INSTRUCTIONS CAREFULLY: Place numbers in the boxes to designate the expressions which are characteristic of the commercial generations of the 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 quantitative 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: Evansville, WI

2. FALL DORMANCY:

FALL DORMANCY (DETERMINED FROM SPACED PLANTINGS)

TESTING INSTITUTION AND LOCATION	DATE OF LAST CUT	DATE REGROWTH SCORED	APPLICATION VARIETY	REGROWTH SCORE OR AVERAGE HEIGHT			LSD .05
				CHECK VARIETIES*			
				Vernal	Saranac	DuPuits	
W-L Research, Inc Warden, WA	9/14/90	10/16/90	6.6	5.1	7.0	8.8	0.9

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

Specify scoring system used: Height in inches from a replicated space-plant nursery.

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: Evansville, WI

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

1 Primary Area of Adaptation       2  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):

0  3 Days Earlier Than       4  
 Same As       3      1 = CUF 101      2 = Mesilla      3 = Saranac      4 = Vernal      5 = Norseman

0  3 Days Later Than       2      TEST LOCATION: Evansville, WI

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)      Baltimore, MD  
 COLOR CHART VALUE (Specify chart used): Munsell Color Charts, 1st edition, 1952. Munsell Co., Inc.,  
 APPLICATION VARIETY: 4/6  
 VERNAL: 5/6  
 TEST LOCATION: Evansville, WI - Measurements taken June 12, leafhoppers controlled with insecticide.

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):

0  9  5 % Purple and Violet (Subclasses 1.1 to 1.4)        0 % Blue (Subclasses 2.3 and 2.4)  
 0  0  5 % Variegated Other Than Blue (Subclasses 2.1, 2.2, 2.5 to 2.9)        0 % Yellow (Subclasses 4.1 to 4.4)  
  0 % Cream (Class 3)        0 % White (Class 5)  
 TEST LOCATION: Warden, WA

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

1  0  0 % Tightly Coiled (One or more coils, center more or less closed)        0 % Loosely Coiled (One or more coils, center conspicuously open)  
  0 % Sickle (Less than 1 coil)      TEST LOCATION: Warden, WA

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
(MR)	Anthracnose, Race 1 ( <i>Colletotrichum trifolii</i> )	Application	Syn 1	14	312	---	% Resis. LSD (.05)  11	W-L Research, Inc. Evansville, WI (1988)
		<del>ARC</del> Saranac AR (R)		43	295	---		
		Saranac (S)		1	298	---		
SCORING SYSTEM: % resistance based on survivors								
	Anthracnose, Race 2 ( <i>Collectotrichum trifolii</i> )	Application						
		Saranac AR (R)						
		Arc (S)						
SCORING SYSTEM:								
(HR)	Bacterial Wilt ( <i>Corynebacterium insidiosum</i> )	Application	Syn 1	58	175	2.43	0.62	W-L Research, Inc. Evansville, WI (1989)
		Vernal (R)		35	166	3.21		
		Narragansett (S)		1	173	4.55		
SCORING SYSTEM: Plants scored 0 and 1 considered resistant on scale of 0-5.								
	Common Leafspot ( <i>Pseudopeziza medicaginis</i> )	Application						
		MSA-CW3AN3 (R)						
		Ranger (S)						
SCORING SYSTEM:								

10. A. PEST RESISTANCE (Continued):

DISEASE	VARIETY	SYN. GEN. TESTED	PERCENT RESISTANT PLANTS	NUMBER OF PLANTS TESTED	ASI	ASI LSD .05	INSTITUTION, YEAR, LOCATION, FIELD OR LABORATORY
Downy Mildew ( <i>Peronospora trifoliorum</i> )  Isolate, if known:	Application						
	Saranac (R)						
	Kanza (S)						
	SCORING SYSTEM:						
Fusarium Wilt ( <i>Fusarium oxysporum</i> f. <i>medicaginis</i> )  (HR)	Application	Syn 1	67	158	1.35	0.30	W-L Research, Inc. Evansville, WI (1989)
	<del>Application</del> Agate (R)		54	167	1.87		
	<del>Application</del> MnGN-1 (S)		4	158	4.14		
SCORING SYSTEM: Plants scored 0-5; 0 and 1 considered resistant and 5 = dead plant.							
Phytophthora Root Rot ( <i>Phytophthora megasperma</i> f. <i>medicaginis</i> )  (R)	Application	Syn 1	30	230	----	% Resis. LSD (.05) 8	W-L Research, Inc. Evansville, WI (1989)
	Agate (R)		27	226	----		
	Saranac (S)		1	209	----		
SCORING SYSTEM: Percent resistance based on seedling survival.							
Verticillium Wilt ( <i>Verticillium albo-atrum</i> )  (R)	Application	Syn 1	27	305	3.51	0.38	W-L Research, Inc. Evansville, WI (1989)
	Vertus (R)		26	318	3.43		
	Saranac (S)		1	302	4.59		
SCORING SYSTEM: Plants scored 1-5; 1 and 2 considered resistant and 5 = dead plant.							
Other (Specify) Aphanomyces Root Rot  Aphanomyces euteiches Drechs.  (S)	Application	Syn 1	5	232	---	% Resis. LSD (.05) 7	W-L Research, Inc. Evansville, WI (1989)
	(R) WAPH-1		57	206	---		
	(S) Agate		8	229	---		
SCORING SYSTEM: Percent resistance based on seedling survival.							
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 ( <i>Hypera postica</i> )	Application						
	Arc (R)			100			
	Saranac (S)						
SCORING SYSTEM:							

6

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 ( <i>Acyrtosiphon kondoi</i> )  (R)	Application	Syn 1	49	206	3.4	0.4	W-L Research, Inc. Bakersfield, CA (1990)
	CUF 101 (R)		59	200	2.9		
	PA-1 (S)		16	218	4.4		
SCORING SYSTEM: Plants scored 1-5, with 1 and 2 considered resistant and 5 = dead plant.							
Pea Aphid ( <i>Acyrtosiphon pisum</i> )  (HR)	Application	Syn 1	59	192	2.1	0.4	W-L Research, Inc. Bakersfield, CA (1989)
	Kanza (R)		55	188	2.5		
	Ranger (S)		9	202	4.0		
SCORING SYSTEM: Plants scored 1-5; 1 and 2 resistant, 5 = dead plant.							
Spotted Alfalfa Aphid ( <i>Therioaphis maculata</i> )  Biotype, if known: (H)  (HR)	Application	Syn 1	50	168	3.3	0.2	W-L Research, Inc. Bakersfield, CA (1989)
	Kanza (R)		34	179	3.8		
	Ranger (S)		0	185	4.9		
SCORING SYSTEM: Plants scored 1-5; 1 and 2 resistant, 5 = dead plant							

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 ( <i>Empoasca fabae</i> )	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 ( <i>Meloidogyne hapla</i> )  (LR)	Application	Syn 1	10	146	3.0	0.5	W-L Research, Inc. Warden, WA (1990)
	Nev. Syn. XX (R)		93	152	1.1		
	Lahontan (S)		2	149	3.4		
SCORING SYSTEM: Plants scored 1-4 with 1 (no galls) considered resistant and 4 (severely galled, over 100 galls/plant) considered susceptible.							



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 ( <i>Meloidogyne incognita</i> )	Application						
	Moapa 69 (R)						
	Lahontan (S)						
	SCORING SYSTEM:						
Stem Nematode ( <i>Ditylenchus dipsaci</i> )  (LR)	Application	Syn 1	10	207	4.2	0.3	W-L Research, Inc. Warden, WA (1990)
	Lahontan (R)		47	211	2.9		
	Ranger (S)		4	202	4.4		
	SCORING SYSTEM: Plants scored 1-5; 1 and 2 resistant and 5 = dead plant.						
Other (Specify)	Application						
	(R)						
	(S)						
	SCORING SYSTEM:						

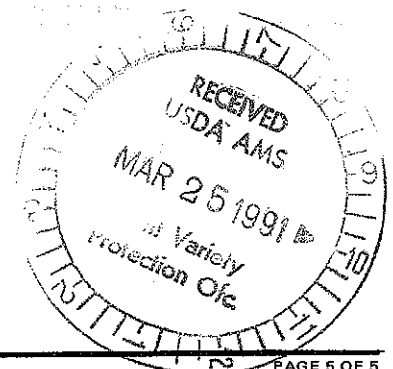
11. INDICATE THE VARIETY THAT MOST CLOSELY RESEMBLES THE APPLICATION VARIETY FOR EACH OF THE FOLLOWING CHARACTERS:

CHARACTER	VARIETY	CHARACTER	VARIETY
Winterhardiness	Apollo Supreme	Plant Color	Arrow
Recovery After 1st Cut	Magnum III	Crown Type	WL 320
Area of Adaptation	Pioneer 5432	Combined Disease Resistance	Oneida VR
Flowering Date	Arrow	Combined Insect Resistance	Fortress

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.



9100147

**Exhibit D**

**Additional Description of Variety**

WL 322 HQ is a moderately fall-dormant variety adapted for use in the northeast, north central, and northwestern U.S. Mid-summer growth is erect and fall growth is semi-erect.

WL 322 HQ appears to have high forage quality (high crude protein, low acid and neutral detergent fibers) when compared to some commercially available varieties (Tables A-E). Forage quality of WL 322 HQ has been consistently high over locations, years, and cuttings within locations.

Table 1 &gt; Bacterial Wilt Resistance\* - Evansville, WI (1989)

<u>Entry</u>	<u>% Resistance</u>	<u>A.S.I.</u>
Vernal (R)	35	3.21
Narragansett (S)	1	4.55
WL 322 HQ (HR)	58	2.43
WL 320 (R)	38	3.10
LSD (.05)		0.62
CV %		14

\*Data obtained from a replicated space-plant field nursery on seven-month old plants.  
Planted 2/15/89, scored 10/4/89.

9106147

Table 2 &gt; Verticillium Wilt Resistance\* - Evansville, WI (1989)

<u>Entry</u>	<u>% Resistance</u>	<u>A.S.I.</u>
Vertus (R)	41	3.15
Saranac (S)	5	4.49
Oneida VR (HR)	52	2.85
WL 322 HQ (R)	35	3.18
WL 320 (MR)	19	3.74
LSD (.05)	9	0.26
CV %	19	4

\*Data obtained from a replicated greenhouse flat test.

Scoring System Used: Plants scored 1-5, with 1 and 2 considered resistant and 5 = dead plant. 294 plants tested.

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Table 3 > Phytophthora Root Rot Resistance\* - Evansville, WI (1989)

<u>Entry</u>	<u>% Resistance</u>
Agate (R)	34
Saranac (S)	4
WL 322 HQ (R)	38
Oneida VR (MR)	25
LSD (.05)	7
CV %	12

\*Data obtained from a replicated greenhouse tub test.

Scoring System Used: Percent resistance based on seedling survival. 246 plants tested.

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Table 4 > Anthracnose Resistance\* - Evansville, WI (1989)

<u>Entry</u>	<u>% Resistance</u>
Saranac AR (R)	48
Saranac (S)	4
WL 322 HQ (MR)	21
Apollo Supreme (HR)	56
Fortress (R)	39
LSD (.05)	8
CV %	25

\*Data obtained from a replicated greenhouse flat test.

Scoring System Used: Percent resistance based on seedling survival. 289 plants tested.

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Table 5 &gt; Spotted Alfalfa Aphid Resistance\* - Bakersfield, CA (1989)

<u>Entry</u>	<u>% Resistance</u>	<u>A.S.I.</u>
Kanza (R)	41	2.9
Ranger (S)	2	4.7
WL 322 HQ (HR)	58	2.2
Magnum III (MR)	16	3.9
Apollo Supreme (S)	4	4.5
LSD (.05)	8	0.6
CV %	17.7	10.3

\*Data obtained from a replicated greenhouse flat test.

Scoring System Used: Plants scored 1-5, with 1 and 2 considered resistant and 5 = dead plant. 177 plants tested.

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Table 6 > Phytophthora Root Rot Resistance\* - Evansville, WI (1990)

<u>Entry</u>	<u>% Resistance</u>
Agate (R)	36
Saranac (S)	3
WL 322 HQ (R)	43
Pioneer 5432 (MR)	17
LSD (.05)	11
CV %	26

\*Data obtained from a replicated greenhouse tub test.

Scoring System Used: Percent resistance based on seedling survival. 245 plants tested.



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Table 7 > Fall Dormancy Reaction\* - Warden, WA (1990)

<u>Entry</u>	<u>Fall Height (Inches)</u>
DuPuits (5)	8.8
Saranac (4)	7.0
Ranger (3)	6.5
Vernal (2)	5.1
WL 322 HQ (4)	6.6
Arrow (3)	5.7
Mean	7.0
LSD (.05)	0.9
CV %	8.9

\*Fall height data collected from a replicated space-plant field nursery.

Scoring System: All plots (4 replicates per entry) were clipped on September 14, 1990. The height of individual plants within each plot (approximately 30 plants per plot) were measured and a single mean plot value calculated. The fall height (in inches) values for each entry within a replicate were used in the analysis of variance.

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Table A. 1990 Forage Quality Evaluation\*  
Evansville, Wisconsin  
Seeded August 9, 1989

<u>Entry</u>	<u>% CP</u>	<u>% ADF</u>	<u>% NDF</u>	<u>RFV</u>
WL 322 HQ	21.8	30.2	40.4	150.7
WL 320	21.7	30.4	40.7	149.4
Chief	21.2	30.8	40.7	149.0
G-2841	21.1	30.7	40.9	148.1
2980	20.8	30.5	41.1	147.9
Allegiance	21.1	30.7	41.0	147.7
Pio. 5364	20.4	30.7	41.1	147.3
Promise	21.0	31.0	41.6	145.2
Mean	21.1	30.6	41.0	148.1
LSD (.05)	0.6	NS	1.0	NS
CV %	1.8	2.0	2.5	3.2

\*Forage quality data averaged over four harvests in 1990 (5/22, 6/25, 7/30, 8/30).

Table B. 1989 University of Minnesota Forage Quality Evaluation\*  
 Rosemount, Minnesota  
 Seeded May 11, 1989

Entry	First Flower Forage Quality by Harvest							
	% CP		% ADF		% NDF		RFV	
	<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>
WL 322 HQ	16.1	25.1	30.0	30.0	43.4	39.5	141	154
MultiKing 1	15.5	23.2	28.3	31.6	42.4	40.2	147	149
Legend	15.2	22.8	32.0	32.9	45.7	41.6	130	142
Saranac AR	16.0	23.0	31.7	33.5	44.5	42.0	135	139
LSD (.05)	1.0	1.1	2.0	1.8	1.9	1.8	9	9

\*Plots harvested at first flower on 7/26 and 9/13.

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Table C. 1989 Purdue Forage Quality Evaluation\*  
 West Lafayette, IN  
 Seeded April 13, 1989

<u>Entry</u>	<u>% CP</u>	<u>% ADF</u>	<u>% NDF</u>	<u>Lignin</u>	<u>IVDMD</u>
<b>WL 322 HQ</b>	<b>20.9</b>	<b>25.6</b>	<b>34.3</b>	<b>5.90</b>	<b>71.1</b>
Premier	20.8	26.6	35.5	6.11	69.9
Multi-Plier	20.3	27.5	36.6	6.38	69.8
Magnum III	20.0	27.4	36.7	6.41	69.7
Chief	19.6	28.3	37.4	6.62	69.2
WL 320	20.2	28.0	37.2	6.57	69.1
Vernal	20.4	28.2	37.2	6.43	69.1
Arrow	20.4	28.4	37.9	6.71	68.7
DK 125	19.8	28.3	37.9	6.66	68.6
G-2852	19.0	28.6	38.6	6.90	68.2
WL 225	20.5	29.0	38.4	6.80	68.1
Mean	20.2	28.0	37.3	6.57	68.9

\*Forage quality data obtained from weighted averages over three harvests in 1989 (6/28, 8/3, 9/20).

Table D. 1990 Forage Quality Evaluation\*  
 Avon, New York  
 Seeded April 22, 1989

<u>Entry</u>	<u>% CP</u>	<u>% ADF</u>	<u>% NDF</u>	<u>RFV</u>
WL 322 HQ	19.1	32.3	38.8	153.4
WL 320	18.5	32.8	39.3	150.2
Oneida VR	18.2	32.9	39.6	148.6
Allstar	17.6	33.0	40.7	144.8
Fortress	18.4	33.4	40.9	143.2
Promise	17.9	33.4	41.0	143.1
Pio. 5331	18.1	33.7	40.9	142.8
Mean	18.3	33.0	40.0	147.6
LSD (.05)	1.0	1.5	2.6	12.1
CV %	2.0	1.7	2.5	3.1

\*Forage quality data averaged over three harvests in 1990 (5/31, 7/2, 8/20).

Table E. 1990 Forage Quality Evaluation\*  
 Elkader, Iowa  
 Seeded April 12, 1989

<u>Entry</u>	<u>% CP</u>	<u>% ADF</u>	<u>% NDF</u>	<u>RFV</u>
<b>WL 322 HQ</b>	<b>23.6</b>	<b>29.0</b>	<b>37.8</b>	<b>163.6</b>
Fortress	22.8	30.0	39.0	156.8
WL 320	23.1	29.6	39.2	156.6
Apollo Supreme	23.2	29.6	39.3	156.1
Pio. 5364	22.4	29.8	39.6	154.7
Promise	22.9	30.1	40.1	152.2
DK 125	22.5	30.6	40.4	149.9
Mean	23.0	29.8	39.5	155.4
LSD (.05)	0.7	0.7	1.1	5.0
CV %	2.2	1.7	1.8	2.2

\*Forage quality data averaged over four harvests in 1990 (5/30, 7/2, 8/2, 9/6).

Table A - Fall Growth\* at the University of Minnesota\*\*

<u>Variety</u>	<u>Fall Growth Score</u>
Vernal	6.5
<b>Profit</b>	6.2
Ranger	5.4
<b>WL 322 HQ</b>	4.9
Saranac	4.5

\*Based on fall growth in mid-October after cutting 1st week of September: 1 = tallest, 9 = shortest.

\*\*Data obtained from Minnesota Agricultural Experiment Station Publication #223 - 1992.

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Table B. Warden, Washington  
1991 Fall Dormancy Trial  
Clipped 9/13/91 Scored 10/22/91

<u>Entry</u>	<u>Fall Height (Inches)</u>
Vernal (2)	5.0
Profit (2)	5.3
Ranger (3)	6.5
WL 322 HQ (4)	7.8
Saranac (4)	8.5
LSD (.05)	0.9
CV %	10.7

Scoring Used: Heights of individual space plants were measured (4 replicates, 30 plants per replicate) and averaged to obtain a single fall height value per entry per replicate. This data was then used in the analysis of variance.



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Table C. Pea Aphid Resistance Measured  
at Bakersfield, CA (1991)

<u>Entry</u>	<u>Unadjusted % Resistance</u>	<u>Adjusted % Resistance (x 1.36 by WL)</u>	<u>A.S.I.</u>
WL 322 HQ (HR)	49	67	2.2
Kanza (R)	33	45	2.8
Profit (MR)	14	19	3.6
Ranger (S)	3	4	4.6
Mean	38		3.0
LSD (.05)	8		0.5
CV %	18		9.2

Scoring System Used: Plants scored 1-5, with 1 and 2 considered resistant  
and 5 = dead plant.

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Table D. Spotted Alfalfa Aphid Resistance  
Measured at Bakersfield, CA (1989)

<u>Entry</u>	<u>Unadjusted % Resistance</u>	<u>Adjusted % Resistance (x 1.03 by WL)</u>	<u>A.S.I.</u>
WL 322 HQ (HR)	50	52	3.3
Kanza (R)	34	35	3.8
Profit (LR)	9	9	4.6
Ranger (S)	0	0	4.9
Mean	41		4.4
LSD (.05)	9		0.2
CV %	19		2.4

Scoring System Used: Plants scored 1-5, with 1 and 2 considered resistant  
and 5 = dead plant.

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**Exhibit E**

**Statement of Applicant's Ownership**

WL 322 HQ is a proprietary alfalfa variety developed by the plant breeding staff of W-L Research, Inc., 2000 Oak Street, Bakersfield, California 93301.

Applications for plant variety protection on WL 322 HQ have not been filed in any other country.