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 HERETO 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 (144, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

TOMATO
'NC50-7'

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 this 27th day of January in the year of our Lord one thousand nine hundred and eighty-three.
APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

1. NAME OF APPLICANT(S)
   North Carolina Agricultural Research Service

2. TEMPORARY DESIGNATION
   NC50-7-53-1-3-1

3. VARIETY NAME
   NC50-7

4. ADDRESS (Street and No. or R.F.O. No., City, State, and Zip Code)
   P. O. Box 5847
   North Carolina State University
   Raleigh, NC 27650

5. PHONE (Include area code)
   (919) 737-2718

6. GENUS AND SPECIES NAME
   Lycopersicon esculentum

7. FAMILY NAME (Botanical)
   Solanaceae

8. KIND NAME
   tomato

9. DATE OF DETERMINATION
   Aug. 28, 1981

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.)
    A subdivision of the School of Agriculture & Life Sciences of NCSU, Raleigh, NC with responsibility for research

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
    N/A

12. DATE OF INCORPORATION
    N/A

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
    Dr. D. F. Bateman, Director
    North Carolina Agricultural Research Service
    P. O. Box 5847
    Raleigh, NC 27650

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED
   a. X Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.)
   b. X Exhibit B, Novelty Statement
   c. X Exhibit C, Objective Description of the Variety (Request form from Plant Variety Protection Office.)
   d. X Exhibit D, Additional Description of the Variety

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) FILE FOR PROTECTION OF THE VARIETY IN THE U.S. OR OTHER COUNTRIES?
    a. Yes (If "Yes," give names of countries and dates)
    b. No

19. HAVE RIGHTS BEEN GRANTED IN THE U.S. OR OTHER COUNTRIES?
    Yes
    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

SIGNATURE OF APPLICANT (in ink)

DATE 1/25/82
INSTRUCTIONS

General: Send an original copy of the application and exhibits, at least 2,500 viable seeds, and $500 fee ($250 filing fee and $250 examination fee) to U.S. Department of Agriculture, Agricultural Marketing Service, Livestock, Meat, Grain and Seed Division, Plant Variety Protection Office, National Agricultural Library Building, Beltsville, Maryland 20705. (See section 180.175 of the Regulations and Rules of Practice.) Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.

Item

9 Give the date the applicant determined that he had a new variety based on (1) the definition in section 41(a) of the Act and (2) the date a decision was made to increase the seed.

14a 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) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4) evidence of uniformity and stability.

14b Give a summary statement of the variety’s novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one 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 differences are significant; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.

14c Fill in the Exhibit C, Objective Description form, for all characteristics for which you have adequate data.

14d Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.

15 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 his affirmative decision after the variety has either been sold and so labeled, his decision published, or the certificate has been issued. However, if the applicant specified “No,” he may change his choice. (See section 180.16 of the Regulations and Rules of Practice.)

16 See section 42 of the Plant Variety Protection Act and section 180.7 of the Regulations and Rules of Practice.
NC 50-7, an inbred line in the F7 generation, was developed by the pedigree system of breeding. The 4-way cross ['Blazer' F1 x ('Walter' x 'Flora-Dade') F1] was selfed to the F2 generation. Single plant selections were made in the F2 through F5 generations and a special bulk was made in the F6. Seedling inoculation tests in the greenhouse showed the F4 and subsequent generations to be homozygous resistant to race 1 (Ve gene) of Verticillium dahliae. The F4 selection was homozygous resistant to race 1 (I gene) of Fusarium oxysporum f. sp. lycopersici and susceptible to race 2 in greenhouse seedling inoculation tests.

NC 50-7 appeared stable and uniform in replicated yield trials of the F5 through F7 generations. No off types were observed in these plantings.
NC 50-7 is most similar to 'Flora-Dade' in vine and fruit type. NC 50-7 differs from 'Flora-Dade' in having the \textit{u} gene for uniform green shoulder color of unripe fruit. NC 50-7 lacks the I-2 gene present in 'Flora-Dade'. This gene confers resistance to race 2 of \textit{Fusarium oxysporum} f. sp. \textit{lycopersici}. NC 50-7 has the jointed pedicel character, whereas 'Flora-Dade' has the jointless pedicel (\textit{j-2} gene).
OBJECTIVE DESCRIPTION OF VARIETY
TOMATO (Lycopersicon esculentum Mill.)

Name of applicant
Temporary designation
Variety Name

Choose responses which best represent your variety in the characters below. When a single quantitative value is requested (e.g. fruit weight), your answer should be the mean of an adequate, unbiased sample of plants. The applicant variety should be compared with at least one well-known standard check variety of the same type, and grown in the same trial(s). The characters on this form should be described from plants grown under normal conditions of culture for the variety. Indicate by a check whether trial data are from greenhouse or field plantings. Trials direct-seeded or transplanted.

1. SEEDLING: (2-15 cm, well-illuminated)
   - Anthocyanin in hypocotyl: 1 = absent 2 = present
   - Cotyledon: 1 = normal 2 = giant

2. MATUREPLANT:
   - Growth: 1 = indeterminate 2 = semi-determinate 3 = determinate
   - Size (compared to others of its growth type): 1 = small 2 = medium 3 = large
   - Habit: 1 = sprawling (decumbent) 2 = semi-erect 3 = erect
   - Foliage cover: 1 = light 2 = moderate 3 = heavy

3. STEM:
   - Internode length (between the 1st and 4th inflorescences):
     1 = short ( ) 2 = intermediate (Flora-Dade) 3 = long ( )
   - Branching: 1 = sparse (Brehm's Solid Red) 2 = intermediate (Flora-Dade) 3 = profuse (UC82)
   - Branching at cotyledonary or first leafy node: 1 = present 2 = absent
   - Pubescence: 1 = smooth (no long hairs) 2 = sparsely hairy (scattered long hairs) 3 = densely hairy or canescent
   - No. of nodes below the first inflorescence:
     1 = few ( ) 2 = Intermediate (Flora-Dade) 3 = many ( )
   - No. of nodes (leaves) between inflorescences
   - Thickness: 1 = slender, weak 2 = medium thickness 3 = thick, stiff

4. LEAF:
   - Mature leaf under the 1st to 3rd inflorescence:
     - Division: 1 = tomato 2 = potato 3 = bipinnate, many small leaflets with the large ones
     - Attitude: 1 = semi-erect 2 = horizontal 3 = drooping
     - Leaflet blade: 1 = thin 2 = medium 3 = thick
     - Bases of major leaflets: 1 = even 2 = oblique (the sides offset on petiole)
     - Margins of major leaflets: 1 = nearly entire 2 = shallowly toothed or scalloped 3 = deeply toothed or cut, especially towards base
     - Marginal rolling: 1 = absent 2 = present
7. FRUIT (3rd fruit of 2nd or 3rd cluster):

- **Shape of transverse section:**
  - 1 = round
  - 2 = flattened
  - 3 = angular
  - 4 = irregular

- **Shape of blossom end:**
  - 1 = indented
  - 2 = flat
  - 3 = nipped
  - 4 = G-tapered

- **Shape of stem end:**
  - 1 = flat
  - 2 = indented

- **Shape of pistil scar:**
  - 1 = dot
  - 2 = stellate
  - 3 = linear
  - 4 = irregular

- **Fruit surface:**
  - 1 = smooth
  - 2 = slightly fasciated
  - 3 = moderately fasciated

- **Fruit color (mature-green stage):**
  - 1 = light green ('Lanai', VF145-F5)
  - 2 = Lt. gray-green
  - 3 = apple green ('Heinz 1439 VF')
  - 4 = dark green

- **Fruit pattern (mature-green stage):**
  - 1 = green shouldered
  - 2 = uniform green

- **Mature fruit color (full-ripe):**
  - 1 = white
  - 2 = yellow
  - 3 = tangerine
  - 4 = pink
  - 5 = red
  - 6 = brownish-red
  - 7 = greenish
  - 8 = other (specify)

- **Flesh color (full-ripe):**
  - 1 = yellow
  - 2 = red
  - 3 = crimson
  - 4 = other

- **Epidermis:**
  - 1 = normal
  - 2 = easy-peel

- **Epidermis color:**
  - 1 = colorless
  - 2 = yellow

- **Epidermis thickness:**
  - 1 = thin
  - 2 = average
  - 3 = thick

- **Thickness of pericarp:**
  - 1 = thin (73 mm)
  - 2 = medium (3-6 mm)
  - 3 = thick (> 6 mm)

- **Core size:**
  - 1 = coreless
  - 2 = small
  - 3 = medium
  - 4 = large

- **Core shape:**
  - 1 = solid, unbranched
  - 2 = branched

- **Core texture:**
  - 1 = soft, edible
  - 2 = tough or fibrous

- **Stem scar size:**
  - 1 = small
  - 2 = medium
  - 3 = large

- **No. of locules:**
  - 1 = two
  - 2 = three and four
  - 3 = five or more

- **Fruit firmness** (minimum table-ripe):
  - 1 = extra-soft ('Gardener')
  - 2 = very soft ('Valiant')
  - 3 = soft ('Campbell 28')
  - 4 = fairly firm ('Tropic')
  - 5 = firm ('MM-1')
  - 6 = very firm ('UC-82')

8. PHENOLOGY (Growing degree days, or heat units on a base temperature of 51° F are preferable--but you may report either growing degree days or calendar days. Circle either "days" for calendar days, or "heat units" for growing degree days):

- **Days/heat units from seed to first open flower:**
  - □ days, Application variety □ days, Check variety No. 1
  - □ days, Check variety No. 2

- **Days/heat units from seed/ transplant (indicate which) to first ripe fruit:**
  - □ days, Application variety □ days, Check variety No. 1
  - □ days, Check variety No. 2

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1For definitions of these subjective terms see Kader & Morris (1976) Ind. Proc. 2nd Tomato Quality Workshop.
12. DISEASE AND PEST REACTION (Use code: 0—not tested, 1—susceptible, 2—resistant) If claim of novelty is based wholly or in part upon disease resistance, trial data should be appended (Exhibit D) and should include date and location of trial(s), method of testing, reaction of application variety, and reaction of check varieties (identified by name).

Viral Diseases:
- Cucumber mosaic
- Tobacco mosaic, Race 0
- Tobacco mosaic, Race 1 (Tm 1)
- Tobacco mosaic, Race 2 (Tm 2)
- Tomato spotted wilt
- Tomato-Y virus

Bacterial Diseases:
- Bacterial canker (Corynebacterium michiganense)
- Bacterial spot (Erwinia carotovora)
- Bacterial speck (Pseudomonas tomato)
- Bacterial soft rot (Erwinia carotovora)
- Bacterial spot (Xanthomonas vesicatorium)
- Fungal wilt (Pseudomonas solanacearum)
- Fungal wilt (Pseudomonas solanacearum)
- Other bacterial disease (specify)

Fungal Diseases:
- Anthracnose (Colletotrichum spp.)
- Brown root rot or corky root (Pyrenochaeta lycopersici)
- Bacterial spot (Alternaria solani)
- Botrytis rot or mold (B. cinerea)
- Early blight (Alternaria solani) defoliation
- Fusarium wilt, Race 1 (F. oxysporum f. lycopersici)
- Fusarium wilt, Race 2 (F. oxysporum f. lycopersici)
- late blight, Race 0 (Phytophthora infestans)
- Late blight, Race 1 (Phytophthora infestans)
- Leaf mold, Race 1 (Cladosporium fulvum)
- Leaf mold, Race 2 (C. fulvum)
- Leaf mold, Race 3 (C. fulvum)
- Leaf mold, other races (specify)
- Nailhead spot (Alternaria solani)
- Rhizoctonia soil rot (R. solani)
- Septoria leaf blight (Septoria spp.)
- Southern blight (Sclerotium rolfsii)
- Target leaf spot (Corynespora cassicola)
- Verticillium wilt, Race 1 (V. albo-atrum)
- Verticillium wilt, Race 2 (V. albo-atrum)
- Other fungal diseases (specify)

Insect and Pests:
- Colorado potato beetle (Leptinotarsa decemlineata)
- Collar rot or stem canker (Alternaria solani)
- Collar rot or stem canker (Alternaria solani)
- Cotton bollworm (Spodoptera exigua)
- Leaf mold, other races (specify)
- Tobacco flea beetle (Epitrix hirtipennis)
- Phthorimaea operculella
- Tobacco leaf blight (Septoria spp.)
- Tomato hornworm (Manduca quinquemaculata)
- Tomato leaf blight (Septoria spp.)
- Tomato fruitworm (Heliothis zea)
- Tomato leaf blight (Septoria spp.)
- Whitefly (Trialeurodes vaporariorum)
- Other (specify)

Pollutants:
- Ozone
- Sulfur dioxide
- Other (specify)

REFERENCES

NC50-7 has exceeded 'Walter' and 'Flora-Dade' in yield and percent of U.S. Combination Grade fruit (Tables 1 and 2) and has been lower in percent cull grade (Table 3).

NC50-7 is highly resistant to all types of fruit cracking and has shown a much lower incidence of cracking than 'Walter' and 'Flora-Dade' (Table 4).

NC50-7 tends to set less fruit on the first inflorescence than 'Walter' and 'Flora-Dade', resulting in lower yield in early season (Table 1).

NC50-7 had larger fruit than 'Flora-Dade' in 2 of 3 seasons (Table 5).

Early set fruit of NC50-7 have shown some zippers (adnate anther scars) in all plantings.

Young plants of NC50-7 are more compact (shorter internodes) than 'Walter' and 'Flora-Dade'.

Fruit stems of NC50-7 are tightly attached to fruit and are difficult to remove,
8. **PHENOLOGY** (Growing degree days, or heat units on a base temperature of 51°F are preferable—but you may report either growing degree days or calendar days. Circle either "days" or calendar days, or "heat units" for growing degree days) (Continued):

**Days/heat units from seed/transplant (indicate which) to once-over harvest, if applicable:**

- [ ] days, Application variety [ ] days, Check variety No. 1
- [ ] days, Check variety No. 2

**Days/heat units from breaker to full-ripe stage:**

- [ ] days, Application variety [ ] days, Check variety No. 1
- [ ] days, Check variety No. 2

**Shelf life of ripe fruit:**

- [ ] days, Application variety [ ] days, Check variety No. 1
- [ ] days, Check variety No. 2

2. Fruiting season: 1 = long ('Marglobe')  2 = medium ('Westover')
   3 = short, concentrated ('VF 145')  4 = very concentrated ('UC 82')

3. Relative maturity: 1 = early  2 = medium early  3 = medium  4 = medium late  5 = late

9. **ADAPTATION** (if more than one category applies, list all in rank order):

- [ ] Culture: 1 = field  2 = greenhouse  3 = processing  4 = other
  - 1 = unstaked
  - 2 = staked or trellised
  - 4 = other (specify)

- [ ] Principal use(s): 1 = home garden  2 = fresh market  3 = processing  4 = other

- [ ] Machine harvest: 1 = not adapted  2 = adapted

- [ ] Recommended region: 1 = Northeast/Mid-Atlantic  2 = Southeast
  3 = Midwest/Great Lakes  4 = South-central
  5 = Great Plains  6 = Intermountain West
  7 = Northwest  8 = Central California
  9 = Southwest/Southern California  10 = General
  11 = Other (specify)

2. Growing season temperature: 1 = cool  2 = normal warm  3 = hot  4 = general

1. Growing season humidity: 1 = humid  2 = semi-arid  3 = general

1. Soils: 1 = mineral  2 = organic  3 = general

10. **RESISTANCE OR TOLERANCE TO ENVIRONMENTAL STRESS:**

2. High temperature fruit set (subjective evaluation based on fruit set at temperatures that normally inhibit set in area of evaluation):
   1 = poor  2 = fair  3 = good ('Summertime') AREA  western North Carolina

1. Low temperature fruit set (subjective evaluation based on fruit set at low temperatures that normally inhibit germination):
   1 = poor  2 = fair  3 = good ('Veecrop') AREA  western North Carolina

- [ ] Low temperature seed germination: 1 = poor  2 = fair  3 = good

11. **RESISTANCE TO FRUIT DISORDERS** (Use code: G-unknown, 1-susceptible, 2-resistant):

- 2 = Blossom end rot
- 2 = Catface
- 2 = Cracking, concentric
- 2 = Gold fleck
- 2 = Bursting
- 2 = Cracking, radial
- 2 = Fruit pox
- 2 = Graywall or blotchy ripening
4. LEAF (Mature leaf under the 1st to 3rd inflorescences) (continued):
   - Surface of major leaflets: 1 = smooth  2 = rugose (bumpy or veiny)
   - Leaflet: 1 = normal  2 = slightly wilted  3 = wilted
   - Shape of major leaflets: 1 = broadly ovate  2 = ovate to lanceolate
     3 = slender and lanceolate, tapered to a point
   - Pubescence or hairiness: 1 = smooth  2 = normal  3 = wooly
   - Color of leaflets: 1 = light green (Earlinorth)  2 = medium green
     3 = gray-green  4 = dark green (UC82)
   - Color of leaf on check variety (same scale): Variety Flora-Dade

5. FLORESCENCE:
   - Type: 1 = simple (racemose)  2 = forked (2 major axes)  3 = compound (much branch)
   - No. of flowers setting fruit (in 2nd or 3rd inflorescence):
     1 = 1-4,  2 = 4-8,  3 = 8-12,  4 = 12 or more

6. FLOWER:
   - Calyx: 1 = normal (lobes awl-shaped)  2 = macrocalyx (lobes large, leaflike)
     3 =
   - Flower Style: Style exsertion: pubescence: color: fleshy
     1 = yellow  2 = included absent  3 = sparse gold even with 3 = white stamens dense or tan
   - Anthers: 1 = all fused into tube  2 = separating into 2 or more groups at anthesis
   - Fasciation (1st flower of 2nd or 3rd inflorescence):
     1 = absent  2 = occasionally present  3 = frequently present

7. FRUIT (3rd fruit of 2nd or 3rd cluster):
   - Abscission layer: 1 = present (pedicellate)  2 = absent (jointless)
   - mm. Length of pedicel (from abscission layer or joint to calyx attachment)
   - Maximum fruit: Maximum diameter:
     1 = small cherry (<20 mm)  2 = large cherry (20-35 mm)
     3 = cocktail (35-48 mm)  4 = U.S. extra small (48-54 mm)
     5 = U.S. small (54-58 mm)  6 = U.S. medium (58-64 mm)
     7 = U.S. large (64-73 mm)  8 = U.S. extra large (73-88 mm)
     9 = U.S. maximum large (88-100 mm)  10 = U.S. maximum large (>100 mm)
   - Maximum diameter of check variety, same classes as above
   - (Specify name) Flora-Dade 
   - Fruit weight: 1185 g Check variety Flora-Dade
   - Predominant fruit shape: