

CT92 flue-cured tobacco

Authors: Amankwa, G.A., Mishra, S., Shearer, A.D., Saude, C., Richmond, M.D., et al.

Source: Canadian Journal of Plant Science, 102(5) : 1064-1066

Published By: Canadian Science Publishing

URL: <https://doi.org/10.1139/cjps-2022-0063>


BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

CT92 flue-cured tobacco

G.A. Amankwa , S. Mishra, A.D. Shearer, C. Saude, M.D. Richmond[†], and M. Al-Amery

Canadian Tobacco Research Foundation, P.O. Box 322, Tillsonburg, ON N4G 4H5, Canada

Corresponding author: G.A. Amankwa (email: godfried.amankwa@ctrf1.com)

Abstract

CT92 is a high yielding flue-cured tobacco with resistance to the soil borne fungus Black Root Rot *Chalara elegans* Nag Rag and Kendrick (synonym: *Thielaviopsis basicola* (Berk and Broome) Ferraris). CT92 has a grade index that is comparable to the check CTH14 and showed a higher potential to provide greater economic returns than the check.

Key words: *Nicotiana tabacum* L., tobacco, Black Root Rot, cultivar description

Résumé

La variété à haut rendement de tabac jaune CT92 résiste au pourridié noir causé par le champignon *Chalara elegans* Nag Rag and Kendrick [Syn. : *Thielaviopsis basicola* (Berk and Broome) Ferraris]. Avec un indice qualité comparable à celui du cultivar témoin CTH14, le nouveau cultivar pourrait rapporter davantage aux producteurs. [Traduit par la Rédaction]

Mots-clés : *Nicotiana tabacum* L., tabac, pourridié noir, description de cultivar

Introduction

CT92, a new flue-cured tobacco (*Nicotiana tabacum* L.) developed by the Canadian Tobacco Research Foundation, has been recommended for registration by the Ontario Recommending Committee for Flue-Cured Tobacco (ORCFCT), based on trials conducted at three locations in the tobacco growing regions of Southwestern Ontario in 2019 and 2020. The Canadian Food Inspection Agency, Seed Division, Variety Registration Office issued the registration number 9414 for CT92 on 16 July 2021.

Breeding method

CT92, tested in trials as 16DA9-2, has the pedigree “CT681/20KA15-2//CT572”. In 2012, a cross was made between CT681 and 20KA15-2 in a field at Tillsonburg, Ontario. The following year, a single plant of the resulting F₁ was crossed as the female to CT572. CT681 (Haji et al. 2000) is a Black Root Rot resistant variety that was registered in Canada in 2000, 20KA15-2 is a breeding line with a Black Root Rot resistance genetic background, and CT572 (Haji et al. 2002) is a popular Canadian commercial cultivar with improved leaf quality.

The F₁ seed from the second cross was grown in a greenhouse in the Fall 2013 and one plant was selfed to produce F₂ seed that was grown in a field in 2014. Subsequent selection procedures and performance testing were similar to those previously described for the cultivar CT652 (Amankwa et al. 2009). Briefly, several plants were selected from this population based on physical, agronomic, and chemical char-

acteristics, and the seeds were bulked to grow an F₃ population in 2015 in a seed nursery at Tillsonburg, Ontario. A number of F₃ plants were harvested individually, based on the same criteria used earlier, to plant F₄ head rows in 2016. In 2017, the F₅ seed of an F₄ plant selection (with the designation 16DA9-2) was evaluated for reaction to Black Root Rot, under controlled conditions using a modification test developed by Litton (1983). The selection was found to possess improved resistance to the pathogen. The same year, the F₅ line also was tested in a replicated, preliminary trial together with other selections. F₆ seed was bulked and used to evaluate the line in a Strain Trial in 2018 at Delhi, Ontario, and also tested for reaction to Black Rot under controlled conditions.

16DA9-2 was entered in a registration trial conducted at Simcoe, Delhi, and Aylmer, Ontario, Canada, in 2019 (F_{4:7}) and 2020 (F_{4:8}). Black Root Rot resistance screening under controlled conditions was continued in both 2019 and 2020. F₈ seed collected from several uniform plants in an F₇ row in 2019 will be used for further breeder seed production. In February 2021, 16DA9-2 was supported for registration and named as CT92 by the ORCFCT.

Performance

The 2 year registration trial was conducted based on protocols approved by the ORCFCT, and CT92 was compared with the check CTH14, a commercially available tobacco cultivar, for various economic, agronomic, and chemical traits (Tables 1 and 2). Plots were topped (the stem apex including

Table 1. Yield, grade index, and grade index returns of CT92 compared to CTH14 in the 2019 and 2020 tobacco registration trial conducted at three locations, Ontario.

Characteristics	Cultivar		Standard error of difference
	CTH14	CT92	
2019			
Grade index ^a	69	69	8
Yield (kg/ha)	3670	3963	197
Grade index returns ^b	2542	2745	429
2020 ^c			
Grade index ^a	77	78	8
Yield (kg/ha)	3347	3846	190
Grade index returns ^b	2596	3004	397

^aGrade index is based on a scale of 0–100 (higher the number = more desirable/marketable grades).

^b(Grade index × Yield per hectare)/100. (Higher value likely to provide greater economic returns).

^c2020 values based on two locations due to frost damage prior to the final harvest at the Delhi site.

Table 2. Agronomic, physical, and chemical characteristics of CT92 compared to CTH14 in the 2019 and 2020 tobacco registration trial conducted at three locations, Ontario.

Characteristics	Cultivar		Standard error of difference
	CTH14	CT92	
Agronomic			
Days to topping	63	61	2.2
Topping height (cm)	105.4	108.5	2.1
No. of ground suckers	0.5	0.8	0.3
Ground suckers (kg/ha)	45.4	46.6	8.8
Number of leaves	18.8	17.3	0.4
Width 8th leaf (cm)	30	35	1.4
Length 8th leaf (cm)	61	61	1.1
Area 8th leaf (cm ²)	1242	1454	40
Width 3 tip leaves (cm)	28	31	1.0
Length 3 tip leaves (cm)	61	60	1
Area 3 tip leaves (cm ²)	1175	1276	69
% Overturned leaves	1.3	2.0	1.3
Lead drop	0.0	0.0	0.0
Leaf spacing (cm)	5.6	6.3	0.0
Chemical			
% Total alkaloids (TA)	2.53	2.72	0.16
% Reducing sugars (RS)	18.46	19.82	0.09
Ratio (RS/TA)	7.59	7.46	0.33
Physical			
% Lamina	69.9	72.3	0.6
Black Root Rot rating ^a	S	R	–
Company visual ratings ^b	76	75	2

^aBlack Root Rot; S, susceptible; R, resistant.

^bScale 0–100, where 0 = unusable and 100 = excellent.

flower buds and some top leaves were removed to improve leaf development) when 50% of the plants had stretched terminal buds with one or two flowers opened. The crop was harvested over a period of 5–7 weeks. Yield and leaf quality in 2019 were based on all the locations but in 2020 the final harvest at Delhi, Ontario, could not be done due to frost damage that occurred on 19 September; therefore, two locations were used for yield and quality assessment that year.

CT92 yielded higher than the check each year with a grade index that was comparable to the check, and as a result, CT92 showed a higher potential to provide greater economic returns. On visual company evaluation of usability, from a scale of 0 to 100 (0 = unusable and 100 = excellent), CT92 was rated 75 and did seem comparable to the check (76). CT92 flowered 2 days earlier than the check and was topped approximately 3 cm higher than the check. CT92 showed a slightly wider

leaf spacing on the topped plant, which is considered desirable in machine harvesting; now the common practice in Ontario.

Ground sucker weight was similar between CT92 and the check. The average width of the eighth leaf (mid plant) was 35 cm, compared to 30 cm found on the check. The average length of the eighth leaf was similar to that found on the check. The average area of the three tip leaves was greater than CTH14 and the eighth leaf area was also greater than CTH14. Percent leaf lamina for CT92 was higher than that of CTH14. CT92 showed improved resistance to Black Root Rot, different from the check (susceptible), which will be advantageous for growers where the disease is a major problem.

Pedigree seed stocks

Breeder seed of CT92 will be maintained at the Canadian Tobacco Research Foundation (CTRF), P.O. Box 322, Unit #3, 500 Highway #3, Tillsonburg, ON N4G 4H5, Canada. Certified seed growers can obtain breeder seed from the breeder for increase and distribution to farmers.

Funding information

Financial support provided for this work by Ontario tobacco growers is appreciated.

Acknowledgement

Special thanks go to our on-farm co-operators at Aylmer, Delhi, and Simcoe for allowing us to conduct the variety trials on their farms.

Article information

History dates

Received: 23 March 2022

Accepted: 7 May 2022

Accepted manuscript online: 11 May 2022

Version of record online: 31 August 2022

Copyright

© 2022 Canadian Tobacco Research Foundation. Permission for reuse (free in most cases) can be obtained from copyright.com.

Author information

Author ORCIDs

G.A. Amankwa <https://orcid.org/0000-0003-1273-8961>

Author notes

[†]Present address: Department of Plant Sciences, University of Tennessee Institute of Agriculture, 215 Third Creek Building, 2415 Fletcher Luck Lane, Knoxville, TN 37996, USA.

References

- Amankwa, G.A., Haji, H.M., Mishra, S., DeVos, M., White, A.D., and Van Hooren, D.L. 2009. CT652 flue-cured tobacco. *Can. J. Plant Sci.* **89**: 313–315. doi:[10.4141/CJPS08141](https://doi.org/10.4141/CJPS08141).
- Haji, H.M., Mishra, S., and Devos, M. 2000. CT681 flue-cured tobacco. *Can. J. Plant Sci.* **80**: 167–168. doi:[10.4141/P99-093](https://doi.org/10.4141/P99-093).
- Haji, H.M., Mishra, S., and DeVos, M. 2002. CT572 flue-cured tobacco. *Can. J. Plant Sci.* **82**: 589–590. doi:[10.4141/P01-144](https://doi.org/10.4141/P01-144).
- Litton, C.C. 1983. An efficient greenhouse technique for screening small tobacco seedlings for black root rot resistance. *Tob. Sci.* **27**: 1–2.