



SOUTH DAKOTA  
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# *Alternaria alternata* Internal Rot of *Capsicum* Species, An Understudied Pathosystem Causing Losses in South Dakota Peppers

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## INTRODUCTION

- Internal rot of *Capsicum* spp. is caused by the infection of flowers during anthesis by several fungal pathogens but has not been reported in the U.S
- An outbreak occurred at a South Dakota farm in 2023, causing between 3 and 50% infection across varieties

## METHODS

One **symptomatic pepper** each from nine plants representing nine varieties, one **asymptomatic pepper** each from four plants representing four varieties, and three **flowers** each from six plants representing six varieties were sampled (**Table 1**)

- Peppers and flowers were surface sterilized in 5% NaClO
- Peppers were cut in half aseptically; then internal tissues and flowers were cultured onto ¼ PDA with antibiotics (**Fig. 1**)

## METHODS

- The ITS region was sequenced for all recovered isolates (**Table 1**)
- GAPDH and TEF1 genes were also sequenced and concatenated to ITS for a current subset of *Alternaria* spp. isolates (**Fig. 2**)

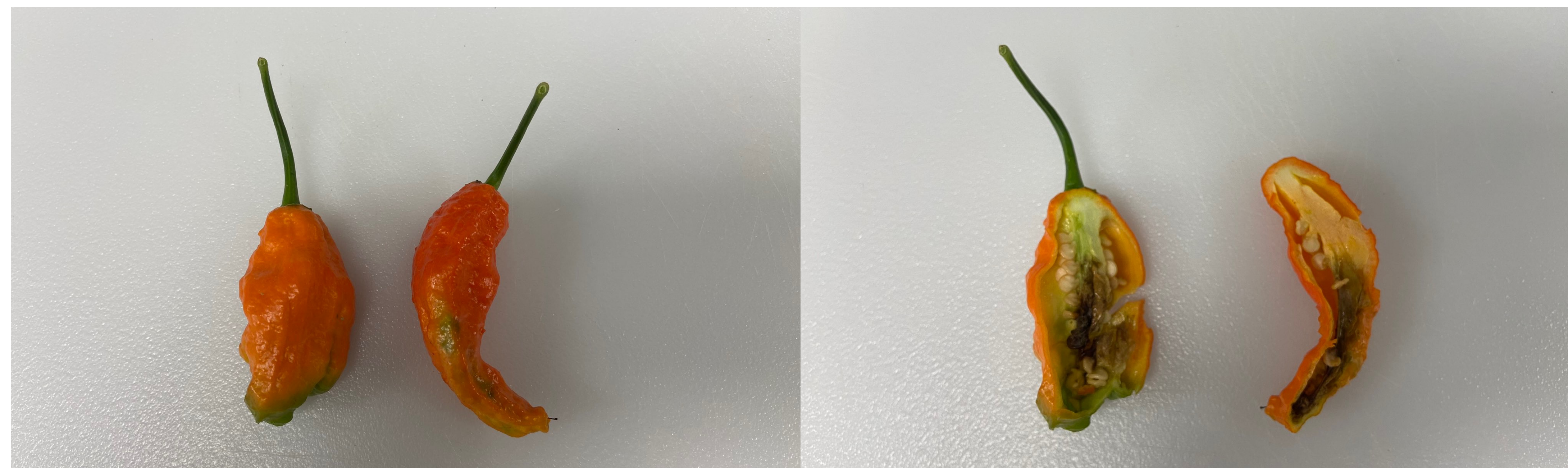


Figure 1. Outside appearance and cross section of an infected pepper

Symptomatic	Sample	ITS of Fungi
<b>Peppers</b>		
Yes	Carolina Reaper	<i>Alternaria</i> sp. (S15)
	Red Habanero	<i>Alternaria</i> sp. (S18)
	Jamaican Hot Chocolate A	<i>Alternaria</i> sp. (S25)
	Jamaican Hot Chocolate B	<i>Epicoccum</i> sp.
	Jamaican Hot Chocolate C	<i>Mucor</i> sp.
	Hot Paper Lantern	<i>Alternaria</i> sp. (S41)
	Red Ghost var. Bhutalocic A	<i>Alternaria</i> sp. (S35)
	Red Ghost var. Bhutalocic B	<i>Epicoccum</i> sp.
	Pale Rider	<i>Alternaria</i> sp. (S39)
	Orange Ghost	<i>Alternaria</i> sp. (S40)
	<i>C. baccatum</i> var. Sugar Bush	<i>Alternaria</i> sp.
	Yellow Ghost	<i>Alternaria</i> sp.
No	Chocolate Hand Grenade	<i>Stemphylium vesicarium</i>
	Trinidad Scorpion	<i>Cladosporium</i> sp.
	<i>C. chinense</i> sp.	<i>Mucor</i> sp.
	Helras	<i>Fusarium</i> sp.
	<b>Flowers</b>	
	Carolina Reaper A	<i>Alternaria</i> sp. (S17)
	Carolina Reaper B	<i>Epicoccum</i> sp.
	Red Habanero A	<i>Alternaria</i> sp.
	Red Harbanero B	<i>Epicoccum</i> sp.
	Trinidad Scorpion A	<i>Alternaria</i> sp.
	Trinidad Scorpion B	<i>Epicoccum</i> sp.
	<i>C. baccatum</i> var. Sugar Bush A	<i>Alternaria</i> sp. (S45)
	<i>C. baccatum</i> var. Sugar Bush B	<i>Epicoccum</i> sp.
	<i>C. baccatum</i> var. Sugar Bush C	<i>Mucor</i> sp.
	Red Ghost A	<i>Alternaria</i> sp.
	Red Ghost B	<i>Epicoccum</i> sp.
	Red Ghost C	<i>Alternaria</i> sp.
	Yellow Scorpion A	<i>Alternaria</i> sp. (S33)
	Yellow Scorpion B	<i>Epicoccum</i> sp.

Table 1. Peppers and flowers sampled from a South Dakota farm in 2023

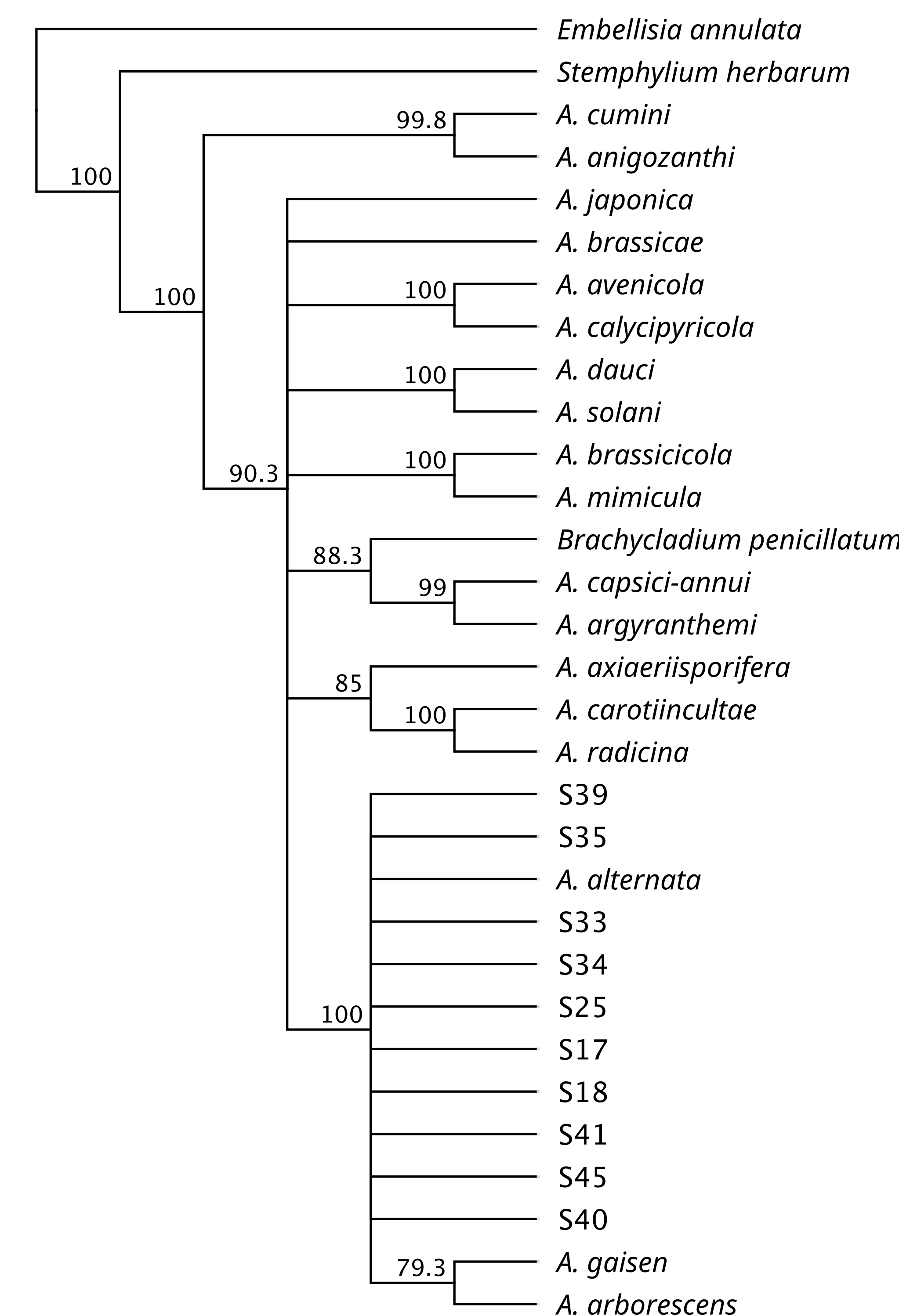


Figure 2. ITS, GAPDH, TEF1 concatenated neighbor-joining phylogeny

## DISCUSSION

- Alternaria* spp. were recovered from 100% of symptomatic fruit and flowers
- Other fungal species were recovered from non-symptomatic fruit
- All *Alternaria* spp. isolates were determined to be *A. alternata*, which has been reported to cause disease in Israel<sup>1</sup> and Australia<sup>2</sup>

### Future Directions:

- Perform Koch's postulates with *A. alternata* isolates with greenhouse peppers
- Conduct field trials to explore natural infection rates across different varieties within the *Capsicum* genus

## ACKNOWLEDGEMENT

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## REFERENCES

<sup>1</sup> Halfon-Meiri, A., and Rylski, I. 1983. Internal mold caused in sweet pepper by *Alternaria alternata*: fungal ingress. *Phytopathology* 73: 67–70.  
<sup>2</sup> Jenny Ekman, Applied Horticulture Research, personal communication, March 7<sup>th</sup> 2024.