APPENDIX A

Abbreviated analysis of variance (ANOVA) tables

Table A1 Analysis of variance of percentage germination of cotton germinated in increasing concentrations of silverleaf nightshade foliar extract, after angular transformation (Table 3.1)

Source	DF	MS	F-value	Pr > F
Concentration	4	618.7	6.18	0.002
Error	20	100.0		
Corrected total	24			
CV (%)	22.9			
R^2	0.55			

Table A2 Analysis of variance of root length of cotton germinated in increasing concentrations of silverleaf nightshade foliar extract (Table 3.1)

Source	DF	MS	F-value	Pr > F
Concentration	4	1289.52	23.14	0.0001
Error	20	55.73		
Corrected total	24			
CV (%)	21.10			
R^2	0.82			

Table A3 Analysis of variance of shoot length of cotton germinated in increasing concentrations of silverleaf nightshade foliar extract (Table 3.1)

Source	DF	MS	F-value	Pr > F
Concentration	4	556.16	12.60	0.0001
Error	20	44.14		
Corrected total	24			
CV (%)	24.50			
R^2	0.72			

Table A4 Analysis of variance of percentage germination of cotton germinated in increasing concentrations of PEG-6000 solution, after angular transformation (Table 3.2)

Source	DF	MS	F-value	Pr > F
Concentration	5	837.09	12.68	0.0001
Error	24	66.00		
Corrected total	29			
CV (%)	17.6			
R^2	0.73			

Table A5 Analysis of variance of root length of cotton germinated in increasing concentrations of PEG-6000 solution (Table 3.2)

Source	DF	MS	F-value	Pr > F
Concentration	5	89.97	2.97	0.0327
Error	23	30.28		
Corrected total	28			
CV (%)	21.08			
R^2	0.39			

Table A6 Analysis of variance of shoot length of cotton germinated in increasing concentrations of PEG-6000 solution (Table 3.2)

Source	DF	MS	F-value	Pr > F
Concentration	5	82.30	31.63	0.0001
Error	23	2.601		
Corrected total	28			
CV (%)	17.27			
R^2	0.87			

Table A7 Analysis of variance of percentage germination (72 hours) of lettuce germinated in increasing concentrations of the water-soluble fraction of an organic silverleaf nightshade foliar extract, after angular transformation (Table 3.3, 24h and 48h not shown)

Source	DF	MS	F-value	Pr > F
Concentration	4	6622.16	111.07	0.0001
Error	20	59.62		
Corrected total	24			
CV (%)	14.5			
R^2	0.96			

Table A8 Analysis of variance of root length of lettuce germinated in increasing concentrations of the water-soluble fraction of an organic silverleaf nightshade foliar extract, after rank transformation (Table 3.3)

Source	DF	MS	F-value	Pr > F
Concentration	3	208.33	83.33	0.0001
Error	16	2.50		
Corrected total	19			
CV (%)	15.06			
R^2	0.94			

Table A9 Analysis of variance of percentage germination (72 hours) of lettuce germinated in increasing concentrations of PEG-6000 solution, after angular transformation (Table 3.4, 24h and 48h not shown)

Source	DF	MS	F-value	Pr > F
Concentration	4	58.43	1.32	0.295
Error	20	44.13		
Corrected total	24			
CV (%)	7.9			
R^2	0.21			

Table A10 Analysis of variance of root length of lettuce germinated in increasing concentrations of PEG-6000 solution (Table 3.4)

Source	DF	MS	F-value	Pr > F
Concentration	4	7.20	5.94	0.0026
Error	20	1.21		
Corrected total	24			
CV (%)	6.37			
R^2	0.54			

Table A11 Analysis of variance of percentage germination (72 hours) of lettuce germinated on paper chromatography fractions, after angular transformation (Table 4.1, 24h and 48h not shown)

Source	DF	MS	F-value	Pr > F
Concentration	5	4514.86	50.95	0.0001
Error	24	88.62		
Corrected total	29			
CV (%)	13.3			
R^2	0.91			

Table A12 Analysis of variance of root length of lettuce germinated on paper chromatography fractions (Table 4.1)

Source	DF	MS	F-value	Pr > F
Concentration	5	78.93	63.78	0.0001
Error	24	1.24		
Corrected total	29			
CV (%)	12.47			
R^2	0.93			

Table A13 Analysis of variance of percentage germination (72 hours) of lettuce germinated in Sephadex column fractions, after angular transformation (Table 4.2, 24h and 48h not shown)

Source	DF	MS	F-value	Pr > F
Concentration	6	1461.06	21.14	0.0001
Error	14	69.12		
Corrected total	20			
CV (%)	10.6			
R^2	0.90			

Table A14 Analysis of variance of root length of lettuce germinated in Sephadex column fractions (Table 4.2)

Source	DF	MS	F-value	Pr > F
Concentration	6	7.74	4.30	0.0115
Error	14	1.80		
Corrected total	20			
CV (%)	15.09			
R^2	0.65			

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SUMMARY

ALLELOPATHIC POTENTIAL OF SILVERLEAF NIGHTSHADE (*SOLANUM ELAEAGNIFOLIUM* CAV.)

1. The possibility that silverleaf nightshade foliage might possess allelopathic properties was researched in this study. This was done by means of germination bioassays conducted under laboratory conditions. The bioassay technique used in allelopathy experiments first needed to be refined to ensure reliable results. An anatomical study on the leaves of silverleaf nightshade was also conducted to confirm current knowledge and to relate specific leaf structures or cells to the allelopathic potential of the foliage.

2. Important factors highlighted during experiments to refine the bioassay technique include the importance of eliminating clouding factors such as osmotic inhibition, pathogenic microorganisms and phytotoxic residues of organic solvents used for extraction or fractionation.

3. Crude water infusions and water-soluble extracts of silverleaf nightshade foliage inhibited germination and early root growth of the two test species, cotton and lettuce. The osmolalities of the extract concentrations used were not inhibitory to either germination or root growth of the test species. Roots of lettuce seedlings exposed to the foliar extract were severely swollen close to the root tip. Cell division and elongation were inhibited in the meristematic and elongation zones, and an apical shift of the root hair differentiation zone occurred.

4. It was established that more than one chemical compound is responsible for the phytotoxic activity of silverleaf nightshade foliar extracts. Indications are that the phytotoxic substances are three flavonoidic compounds, an alkaloid and a saponin.

5. Interesting features observed in the anatomical study of silverleaf nightshade leaves include crystal harbouring idioblasts, various trichomes covering both leaf surfaces including glandular trichomes and two variants of porrect stellate trichomes. One variant emerges from the epidermis surface, while the other variant has intrusive basal cells entering the mesophyll seeming to connect with vascular tissue. It was speculated that glandular trichomes might harbour the phytotoxic substances present in the foliar extracts, or that intrusive stellate trichomes might excrete alkaloids contained in the vascular bundle sheath onto the leaf surface.

6. Further experiments at the University of Pretoria confirmed the phytotoxicity of silverleaf nightshade foliage in a soil environment. Studies confirming silverleaf nightshade allelopathy under field conditions and proper isolation and identification of allelochemicals are still required.