Securing crop protection products for the passionfruit industry

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NSW Department of Primary Industries

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PROJECT TITLE: Securing Crop Protection Products for the Passionfruit Industry

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Purpose of project: This project is part of a 2 phase plan of the "whole of industry" strategy to develop a Pest Management Program for the Australian Passionfruit Industry. Currently growers are restricted to a limited range of approved products to control a wide range of pests and diseases. Several of these products are older generation broad spectrum products which are not compatible in an integrated pest management program, where a short withholding period is required for passionfruit.

Gaps in the current pest management program were identified and the most appropriate pesticide products selected for the priority pests and diseases. These products were applied to passionfruit vines in field trials to generate residue data to support applications for permits or registrations.

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Queensland Fruit & Vegetable Growers and NSW Agriculture provided professional staff for the project.

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MEDIA SUMMARY

The Australian Passionfruit Industry is bringing its pest and disease control program into the new age of targeted pesticide products with shorter residual activity which can be integrated into biological control programs.

This project is the first stage in the overall objective of reducing the industry's reliance on pesticides and complements the major breeding program to develop new varieties which have improved pest and disease resistance.

Developing an effective, safe and environmentally sound pest and disease management program is the highest immediate priority for the Australian industry which is focussed on developing a Quality Assurance program to meet the requirements of Workplace Health & Safety, also for retailers and consumers by providing a safe, high quality fruit product.

After reviewing the existing control program, gaps or weaknesses were identified in a comprehensive series of grower surveys and workshops involving industry, QFVG and the APVMA. An action plan resulted from a 'whole of industry' strategy in which high priority alternative products were identified in cooperation with plant pathologists and entomologists.

This project presents the progress results of field trials conducted on seven high priority products where residue data was required before applications could be submitted for approval by APVMA.

As the benefits of alternative control products are demonstrated, it is expected that the older generation broad spectrum products will be replaced.

Further field trials are required to establish efficacy data for several other products in 2004/05.

TECHNICAL SUMMARY

The Australian Passionfruit Industry is developing its Quality Assurance Program to meet the needs of producers, consumers and the environment. An essential first step in this process was to develop a 'whole of industry strategy' for pest and disease management program for the Australian industry.

The Australian Passionfruit Industry Association (APIA) conducted an industry wide survey of producers and two workshops to produce a priority list of pests and diseases, alternative products, and gaps in the current pest management program.

Products which were no longer considered appropriate because of their broad spectrum activity, residual life and/or interference with biological control programs were identified and alternative target specific products nominated in consultation with plant pathologists and entomologists.

An action plan was developed, identifying and prioritising each pest or disease problem, and the ease of access for approval for nominated control products.

In consultation with APVMA and the Pest Management Officer with QFVG, the industry working group developed an action plan which incorporated an 'ease of access' rating and the pest priority rating to give an action priority for each problem pest and product.

Products for which there was readily available MRL's and available residue data were processed as 'desk top' applications to APVMA for minor use approval. Those products requiring residue and/or efficacy data were identified for field trials.

This project presents the progress results of residue analyses from field trials to generate data for seven nominated products required by industry for approval by APVMA.

Trial protocols were developed, and funding approved for the commencement of field trials from June to August 2003.'

Products for residue analysis included iprodione (Rovral®) , bifenthrin (Talstar®), dicofol (Kelthane®), prochloraz (Octave®), imidacloprid (Confidor®), Chlorphyrifos (Lorsban®) and dimethoate (Rogor®).

Residue analysis results have been received on all products except imidacloprid to date.

The next stage of the process to develop an integrated pest and disease management schedule for passionfruit is to be undertaken in a new project to commence 01 July 2004. This will involve efficacy trials on a range of alternative products for control of Anthracnose, Red Scale and Passionvine mite and Qld fruit fly.

1. INTRODUCTION

This project was undertaken to address the highest immediate priority of the Australian Passionfruit Industry, the development of a pest and disease management program which satisfies the needs of industry to control a wide range of pests and diseases with effective, safe products which are compatible with biological control agents and have low environmental impact.

The Australian Passionfruit Industry has set a target of developing a Quality Assurance Program which meets the requirements of Workplace Health & Safety as well as consumers and the market place as soon as practicable.

To achieve this, the APIA has initiated the first stage of the QA program, to develop an effective and appropriate pest and disease control program. Presently, there are a range of products, being used to control a wide range of pests and diseases. Many of these are older chemicals have broad spectrum activity, which are not providing effective or targeted control and have problems in meeting the residue requirements for one-day withholding period required for every day harvest and/or are not compatible with IPM programs.

Alternative products and biological control agents are now available to meet the requirements for safe produce whilst providing effective control and environmentally sustainable production.

Generating residue data for highest priority chemical products to control the major pests and diseases is the first phase of this objective.

Breeding new varieties of passionfruit with improved pest and disease resistance is also a major research and development focus for the industry, to reduce the industry's reliance on chemicals. These two project areas are therefore complementary with the overall objective to develop an effective, safe pest and disease control program for growers, and safe, high quality fruit for consumers.

The purpose of this project is to meet the requirements of APVMA for residue data on the selected products required by industry and submit applications for approval by permit or registration.

2. MATERIALS AND METHODS

Industry Consultation
Identifying gaps or weaknesses in the current pest and disease control program was achieved by conducting an industry-wide survey of pest and disease problems and allocating a priority (1-5) to the importance of each.

Two workshops involving the QFVG Pest Management Officer, Janine Clark, a minor use specialist from NRA (APVMA), members of the APIA executive and their technical advisor, developed a 'whole of industry' strategy. This strategy identified actions required to achieve registration or permit for use by industry.

Action Plan
For products already registered or permitted for use, desktop research was undertaken to achieve label amendments where required. For products where access was relatively simple, off-label permits were sought, particularly where similar use patterns existed for other crops.

For products where no registration or permit existed, protocols were developed in cooperation with QFVG and APVMA to conduct field trials to generate the required residue data.

Seven candidate products for field residue trials were identified and a grower co-operator secured to conduct the trials.

Field Trials
Field applications commenced on 02 June 2003.

The trial design included two sites where treatments were duplicated in buffered plots of sufficient size (6 vines) to apply the pesticide under conditions which reflect normal commercial practices and provide sufficient quantities of representative fruit samples for analysis.

Applications of each pesticide were as follows –

iprodione (500g/L) - 4 applications 14 days apart at the rate of 100mls/100L water – starting date 02/06/03 – completion date 22/07/03

bifenthrin (100g/L) – 2 applications 7 days apart at the rate of 60ml/100L water – starting date 02/06/03 – completion date 16/06/03

dicofol (480g/L) – 3 applications 7 days apart at the rate of 200ml/100L water – starting date 02/06/03 – completion date 23/06/03

prochloraz (462g/kg) 4 applications 14 days apart at the rate of 100g/100L water – starting date 02/06/03 – completion date 22/07/03

imidacloprid (200g/L) 2 applications 7 days apart at the rate of 25mls/100L water – starting date 02/06/03 – completion date 16/06/03

chlorpyrifos (500g/L) 2 applications 14 days apart at the rate of 50mls/100L water – starting date 02/06/03 – completion date 23/06/03

dimethoate (400g/L) 4 applications 21 days apart at the rate of 70mls/100L water – starting date 02/06/03 – completion date 11/08/03

Applications of candidate products were made with research equipment similar to commercial equipment and standard operating procedures were followed in respect of calibration and sprayer operations and measuring and mixing of test products.

Samples for Analysis
Samples for analysis were taken from two separate areas of the farm and one untreated control sample. Each sample contained 1kg of fruit (approximately 12 fruit) which was kept frozen until time of analysis.

To measure the rate of decline of the test product in the fruit, samples were collected on the day of the final application, and 1, 2 and 7 days after the final application.

Mature fruit was picked off the vine to avoid ground contamination and fruit was not washed.

Samples were stored separately in clearly marked plastic bags stating sample number, the batch number of the candidate product, the product name and date the sample was collected.

To avoid contamination, control (untreated) fruit was collected first. Samples were frozen immediately on collection and kept frozen during storage, dispatch and transport for analysis.

Samples were kept frozen at the laboratory at -18° in a freezer until time of analysis.

Details of the methods of analysis were provided with the sample test results under a confidentiality clause provided by the laboratory.

Submissions to APVMA
Active consultation between the Pest Management Officer of QFVG and APVMA minor use section has resulted in a range of actions to secure appropriate permits, registrations or label changes for nominated products.

3. RESULTS

Whole of Industry Strategy

The Whole of Industry Strategy for the Australian Passionfruit Pest Management Program are presented in Tables 1, 2 and 3.

Passionfruit Pest Management Program
"Whole of Industry" Strategy
(An APIA & QFVG Joint Initiative)

Table 1. Lists the chemical access gaps and those with WHP's that industry desires to change.

PEST	CHEMICAL	REGISTRATION STATUS	WHP	EXPIRY DATE	MRL
Sucking Bugs – Green Vegetable Bug	Endosulfan	Full registration - PF	14 Days	N/A	2mg/kg for "fruit"
Aphids	Rogor – dimethoate	Full registration – PF	7 Days	N/A	5mg/kg (NRA) & 2mg/kg (ANZFA for PF
Sucking bugs	Confidor – imidacloprid	No registration or permit known			
Red Scale	DCtron – petroleum oil	No registration or permit known			None needed
Red Scale	Supracide – methidathion	Full registration – PF	14 Days	N/A	0.2mg/kg for PF
Red Scale	Applaud- buporofezin	No registration or permit known			
Brown scale	DCtron- petroleum oil	No registration or permit known			
Brown scale	Applaud – buporofezin	No registration or permit known			
White louse	DCtron- petroleum oil	No registration or permit known			None needed
White louse	Supracide – methidathion	No registration or permit known			
Mealy bug	DCtron – petroleum oil	PER70006 DPI board approval for PF	1 day	N/A	None needed
Mealy bug	Supracide – methidathion	Full registration –PF	14 days	N/A	0.2mg/kg for PF
Mites –passion vine mite	Kelthane- dicofol	PER3482	7 days	07/03/04	5mg/kg for fruit
Mites	DCtron- petroleum oil	No registration or permit known			None needed
Fruit fly	Hy-mal & yeast	Registration to use hy-Mal on fruit as a lure for all fruit fly	N/A	N/A	
Qld fruit fly	Dimethoate	Full registration-PF	7 days	N/A	
Caterpillars	Lorsban- chlorpyrifos	Full registration for Qld fruit fly – PF		N/A	0.05mg/kg for PF

Table 1 continued……

PEST	CHEMICAL	REGISTRATION STATUS	WHP	EXPIRY DATE	MRL
Ants – coastal brown	Chlorpyrifos	PER70022DPI board approval for PF	None given	N/A	
Ants	Regent – fipronil	No registration or permit known			
Hoppers	Lorsban-chlorpyrifos	Full registration for Qld fruit fly – PF			
Hoppers	Rogor – dimethoate	Full registration for aphids – PF			
Weevils	Ambush – permethrin	No registration or permit known			
Monolepta beetles	Bugmaster – carbaryl	Full registration for fruit in general for wingless grasshopper	3 days	N/A	5mg/kg for fruit
Broadleaf weeds	Basta	Full registration – PF	N/A	N/A	0.2mg/kg for "subtropical fruit, inedible peel"
Broadleaf weeds – annual weed control	Gramoxone	Full registration for orchards & vineyards	1 day	N/A	0.2mg/kg codex for PF
Grasses	Roundup-glyphosate	PER3446 for PF	N/A	30/09/02	0.05mg/kg for PF
Alternaria alternata	Rovral – iprodione	Full registration – PF	7 days	N/A	10mg/kg for PF
Alternaria alternata	Octave	No registration or permit known			
Alternaria passiflorae	Dithane – mancozeb	PER70078 DPI Board Approval for A.alternata	14 days	N/A	3mg/kg for PF
Alternaria passiflorae	Copper hydroxide Copper oxychloride	Full registration for phytophthora – PF Full registration – PF	1 day	N/A	N/A
Anthracnose	Amistar – azoxystrobin	PER4698 for cladosporium – PF	2 days	31/12/01	0.5mg/kg for PF
Anthracnose	Copper hydroxide Copper oxychloride	Full registration for phytophthora – PF Full registration – PF	1 day	N/A	N/A
cladosporium	Amistar - azoxystrobin	PER4698 for cladosporium – PF	2 days	31/12/01	0.5mg/kg for PF
phytophthora tip blight	Fosject – Phosphorous acid	No registration or permit known			
Phytophthora fruit blight	Fosject – Phosphorous acid	No registration or permit known			
Stem canker	Copper hydroxide	Full registration for phytophthora – PF	1 day	N/A	N/A

Table 2. lists the priorities for actions to be undertaken in pest management for the industry

PROBLEM	PEST PRIORITY RATING (1-5)	EASE OF ACCESS RATING (1-5)	ACTION PRIORITY (1-5) (pest rating x ease of access rating)	ACTION TO TAKE
Alternaria alternata/mancozeb permit WHP 14->1 day	1	1	1	Apply to amend permit with data generated for registration
Scale-red,soft/DC tron petroleum oil	1	1	1	Apply for permit
PER3446 grass/ glyphosate (extend all states)	1	1	1	Apply to amend permit to include all states
PER3482 mites / Kelthane WHP 7->1 day, extn to all states	2	1	2	Apply for permit amendment to include all states & ask NRA for residue trial requirements
Alternaria alternata & passiflorae anthracnose/Amistar & Boost	1	2	2	Waiting permit renewal for Amistar, then registration expected Q3 02. Boost expecting registration Q2 03
Phytophora / Phos Acid	3	1	3	Apply for permit
Caterpillars (heliothis, loopers)/bts	3	1	3	See if its covered on new label, if not apply for permit
Mealy bug, scale, white louse scale / Applaud	1	3	3	Apply for permit with Custard apples ask to generate any data during life of permit.
Alternaria alternata & passiflorae/ Octave	1	4	4	Ask NRA for residue trial requirements & apply for permit. Possibly generate during life of permit.
Ants (bait) / Regent	2	2	4	Wait for registration, follow up company
QFF / dimethoate	1	5	5	Industry to promote baiting instead of trying to change infield spray WHP
Alternaria alternata/ Rovral WHP 7->1 day	1	5	5	Ask NRA for residue trial requirements. Apply for permit
FSB, GVB, RGB & dimple bug / Confidor	2	3	6	Ask NRA for residue (& efficacy) trial requirements. Contact Dan Smith, about to start work on Confidor in citrus.
Caterpillars, mites, weevils, monolepta / Talstar	2	4	8	Ask NRA for residue trial requirements. Apply for permit.
Grasshoppers, monolepta, caterpillars / carbaryl	(GH4)(M3)(C3)	4	12	Ask NRA for residue trial requirements. Apply for permit, mention sporadic nature of pest attacking in plague proportions at certain times.

Table 3. Lists the information given to the APVMA to assess data requirements and assist future actions by QFVG and industry.

PROBLEM	PROPOSED RATE	METHOD OF APPLICATION	MAX. NO. APPLNS	WHP	TIMING OF USE	SPECIAL PRECAUTIONS/ CRITICAL COMMENTS	INDUSTRY COMMENTS
Alternaria alternata / mancozeb permit 70078 WHP 14->1 day	0.15kg/100L (750-800kg product)	Ground rig spray equipment	Not known	14 days	Apply at 10-14 day intervals from Oct to May & for every 21 to 28 days for the remainder of the year.	Iprodione sprays should be alternated with mancozeb to help reduce the development of resistance	Industry has generated data with Griffin Corp to reduce the WHP for mancozeb from 14-1 day. We would like to use this data to reduce the permit also.
Scale-red, soft /DC tron petroleum oil	1L/ 100L	Ground rig spray equipment	Not known	1 day	Apply when heavy scale populations occur on vines, foliage or fruit. Application is most effective against young crawler stage	Do not apply if vines need watering	PER70006 only has mealy bug on it & needs to cover other pests such as scale
PER3446 grass / glyphosate (extend all states)	10-15ml / water	Ground rig spray equipment	12 / year	Not required	Monthly application as necessary to control weeds	Do not allow spray or spray drift to contact any part of the plant or trunk. Apply to the base of the plant using a shielded sprayer	Existing permit needs residue data generated and addition of other states to it.
PER3482 mites / Kelthane WHP 7-> 1 day, extn to all states	Product with 240g/L dicofol: 200mL/100L Product with 480g/L dicofol: 100mL/100L	Ground rig spray equipment	3 / year	7 days	DO NOT apply more than 3 applications per year, from spring to late summer	Apply when infestation manifests	QFVG currently holds the permit for Qld only. Industry would like to reduce the WHP to 1 day & make the use available in all states. MRL for fruits (except strawberry) of 5mg/kg exists

Table 3 continued.

PROBLEM	Proposed rate	Method of Appln	Max. No. applns	WHP	Timing of use	Special precautions/critical comments	Industry comments
Alternaria, alternata & passiflorae, anthracnose/Amistar & Boost	Apply 40g product per 100L water (20g ali/100L)	Ground rig spray equipment	4 per crop	2 days	Apply 3 or 4 consecutive sprays at 10-14 day intervals, between flowering & up to 2 days before harvest. Use shorter interval when climatic conditions favour disease infection	Apply as a block treatment as part of an industry standards spray program. DO NOT apply more than 4 sprays per crop of group k fungicides including azoxystrobins. Follow consecutive sprays of group K fungicides with the same number of sprays from another fungicide group before using Group K again	Current permit is for Cladosporium oxysporum held by Aust Passionfruit Industry. Need to add two more diseases to the list.
Phytophthora/phos. Acid	300ml/100ml water (dilute spraying)	Ground rig spray equipment	Not known	N/A	Apply at 4-6 weekly intervals when conditions favour the disease	MRLs not required as this substance is now table 5 listed	
Alternaria, alternata & passiflorae/octave	50g / 100L water	Ground rig spray equipment	Not known	7 days	Apply as a foliar spray on a 7-14 day schedule	Use the shorter interval when continual wet, cloudy conditions favour disease development	MRLs exist for avocados & mangos of 5mg/kg. The mango WHP is 7 days, t day would be more practical for passionfruit
Ants (bait)/Regent	As per PER4714 ie 5kg bait per hectare	Bait stations broad casting	Not known	N/A	Apply broadcast baiting by hand in areas where ant colonies are active OR apply in bait stations. DO NOT apply bait by broadcast method within 5 metres of drains (storm water or tidal)	Bait may only be placed within these areas when used in gait stations. DO NOT place any bait material (broadcast or within stations) in areas that are tidal`	QFVG has approached Aventis about them making a suitable bait station for fipronil.
QFF / dimethoate	75ml / 100L water	Ground rig spray equipment	Not known	1 day	Apply as cover spray at first sign of infestation		Not registered as a dip for Qld. May need state extn.
Alternaria, alternata/Rovral WHP 7->1 day	100ml/100l water (apply a minimum of 1.0L per hectare	Ground rig spray equipment	4/season	1 day	Limit use to before & during extended wet periods. Repeat treatment at 14 day intervals as required	Resistance management strategy in place	
FSB / chlorpyrifos	33g/100L water (of 750g/kg ai chlorpyrifos)	Ground rig spray equipment	2 applications	14 days		Apply spray mixture in a strip along the base of the vines. Avoid contact with fruit.	Chlorpyrifos under review. Need lower WHP ie 1-3 days & inclusion of fruit spotting bug as a pest

Actions on nominated chemical products

Actions on the nominated chemical products, which have been achieved through cooperation of the APIA and the QFVG Pest Management Officer, Janine Clark, are as follows –

Petroleum Oil – No action on this product. Biopest (paraffinic oil) is being substituted for use. Application for permit has been submitted to APVMA for further action.

Glyphosate – A five- year permit exists to 15/10/2008, seeking registration on label.

Phosphorous Acid – QDPI&F seeking permit for use on passionfruit at avocado spray rate. Application with APVMA for assessment.

Carbaryl – Considered not appropriate for further use in the passionfruit industry. Alternative products being trialled.

Octave® (prochloraz) – Residue results achieved from field spray trials. Efficacy data required. Trials to commence late June 2004 – 2 sites, under new project 2004/5.

Amistar® (azoxystrobin) – Registered for use with 1 day withholding period for control of cladosporium scab. Efficacy data required for use on anthracnose. Field trials to commence late June 2004 – 2 sites under new project 2004/5.

Mancozeb – Registered for use on passionfruit with 1 day withholding period. No further action.

Regent® (fipronil) – As an ant bait applied to the base of trellis posts. Currently being reviewed by APVMA in the existing chemical review program, which may limit its uses in horticulture.

Dimethoate – Industry is evaluating alternative baiting treatments to establish efficacy data.

Rovral® (iprodione) - Residue data collected from field trials in this project. Industry seeking reduction in WHP from 7 days to 1 day.

Chlorpyrifos – Alternative products are being evaluated in 2004/05 program.

Applaud® (buporofezin) – Permit granted. No further action.

Confidor® (imidacloprid) - Residue trials completed. Results not received. Efficacy trials to commence in new project 2004/05 by Dr Dan Smith QDPI &F.

Talstar® (bifenthrin) - Residue trials completed. Results received. Based on the results, this product not considered appropriate by QDPI&F entomologist Dan Smith. No further action. Withdrawn.

Kelthane® (dicofol) - Submission with APVMA to reduce to 1 day WHP. No decision to date.

Supracide® (methidathion) - Seeking alternative products which are more selective and compatible with IPM program.

Hymal - Yeast autolysate – bait. Efficacy trial being conducted in 2004/5 project by Dan Smith (QDPI&F) to assess most appropriate control comparing spinosad yeast autolysate based baits and abamectin.

Dipterex® (trichlorfon) - Currently registered for use at a 2 day WHP. To be included in Dan Smith's trials in 2004/5 for efficacy data with other candidate products. Application with APVMA to reduce WHP to 1 day.

Residue Analyses

Laboratory reports were received in December 2003 for dicofol, bifenthrin, chlorpyrifos, iprodione and dimethoate and on 18 March 2004 for prochloraz. All samples were analysed successfully.

Results for imidacloprid have not been supplied at the time of preparation of this report.

Complete laboratory reports will be forwarded with the appropriate applications for registration/permit/label change to APVMA for determination. Results and interpretation of lab analysis are confidential under the terms of the analysis agreement.

4. DISCUSSION

While industry awaits the decisions by APVMA on the applications for permits and label changes submitted on the nominated product, efficacy trials are to be conducted in 2004/05 on a range of products required for the pest management program.

These include –
1. prochloraz and azoxystrobin for the control of **anthracnose**.

2. imidacloprid, pyriproxyfen and Biopest oil for the control of **red scale**.

3. acromite, abamectin, Torque and dicofol for the control of **passionfruit mite**.

4. abamectin and spinosad yeast autolysate based baits for the control of **Qld fruit fly**.

5. trichlorfon - meeting requirements for use against **bug pests**.

Following this next phase of the program an IPM & D spray schedule for passionfruit will be produced for the Australian passionfruit industry.

It is expected that the older generation broad spectrum products will be replaced as the benefits of alternative control products are demonstrated.

5. TECHNOLOGY TRANSFER

The 'whole of industry' strategy for the Passionfruit Pest Management program was published in the industry journal 'The Passion Vine'.

Details of permits, registrations and recommended use patterns have also been published in 'The Passion Vine' which is posted to every member of APIA.

A series of technical articles are also being produced by pathologists, entomologists and IPM specialists for 'The Passion Vine' to increase grower understanding of various pests and diseases, their epidemiology and preferred control strategies.

6. RECOMMENDATIONS

- Conduct field efficacy and residue trials in 2004/05 to generate data for registration or permit on selected products for the control of anthracnose, passionfruit red mite, red scale and Qld fruit fly.

- Develop an effective pest management program to suit QA requirements, WH&S for operators as well as environmental and consumer safety.

- Continue the breeding program to reduce the reliance on chemical control.

- Increased R&D emphasis on evaluating biological control agents for scale, mealy bugs.

7. ACKNOWLEDGEMENTS

The excellent cooperation of Mr Jeff Hornery, passionfruit grower, Newrybar NSW, is acknowledged for providing a suitable site for conducting the field trials.

Janine Clark, Pest Management Officer for QFVG has provided a highly professional and ongoing commitment to the development and completion of the project.

Mr Dan Smith, Entomologist with QDPIF at Maroochy Research Station has provided valuable technical direction and support in seeking alternative products.

The valuable assistance of staff in the minor use section of APMVA particularly Alan Norden is also gratefully acknowledged.

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