

**Reducing pesticide use,  
the results of an investigation  
in the Wellington Region**

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## Executive Summary

Nation-wide agrichemical use has declined in recent years. This has been driven by increased awareness of the potential for damage to the environment and human health. Local authorities, government agencies and industry sectors are trying new methods to reduce their agrichemical use in response to industry initiatives and health and safety legislation.

The *Regional Air Quality Management Plan for the Wellington Region* aims to reduce potential adverse effects of agrichemical use by promoting environmentally “friendly” alternatives to the use of agrichemicals (Method 6.4.3).

This report summarises the findings of a study which aimed to start implementing methods in the Air Plan by identify products and methods that could successfully be used as alternatives to agrichemicals. The alternatives included organic type products and best practice methods.

Interviews with local authority staff indicated that alternative methods and products had been tried in many situations, within bounds, given the need for cost effectiveness. National research institutions have been trialing alternative products and best practice methods. Results from some of these trials are not yet available, but the number of trials is indicative of the trend to reduce agrichemical use and potential adverse effects. Broader research identified many situation-specific alternatives to agrichemicals, which could be recommended to urban and rural land users in the Region. This report provides tables of alternative products and methods available.

Issues to emerge strongly from this study included:

- the need for a holistic approach to land use management to reduce agrichemical reliance, rather than the current “quick fix” approach taken with chemical products;
- a holistic approach to land management with regards to the reduction of agrichemical use would have benefits consistent with other Council plans and policies;
- promotion of alternatives to agrichemicals requires a long term approach;
- the need to educate agrichemical users in best practice methods; and
- the need to have alternative product and method information available to a broad cross-section of the public.

While there have been few official complaints to Council compliance staff about adverse effects of agrichemical use, it is recommended that Council take a proactive approach to avoid conflict. Potential conflict areas include urban situations where landowners are spatially close, and rural areas, particularly where more diverse and intensive land management practices have increased.

To this end, it is recommended that the Wellington Regional Council supports initiatives to reduce current agrichemical use, by hosting workshops, publishing information on websites, including their own and in other print forms. This study identified a wide range of industry and interest group contacts which the Council can maintain, to foster communication and information dissemination. By taking such a proactive stance, the Council would be fulfilling its local government leadership role.



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## 1. Introduction

This report summarises an investigation into the promotion of alternatives to agrichemicals for the Wellington Regional Council (“the Council”). The investigation was undertaken as a practicum project as partial fulfilment of requirements for a Masters of Environmental Studies degree at Victoria University.

The Council’s Regional Air Quality Management Plan for the Wellington Region (“the Plan”) identifies a need to avoid or remedy potential adverse environmental effects of agrichemical sprays and powders. To that end, Policy 4.2.20 states that the Council will encourage less reliance on the use of agrichemicals, by promoting *the adoption of more environmentally “friendly” alternatives to the use of agrichemicals* (Method 6.4.3). The Regional Plan Implementation Strategy tags these policies and methods for implementation in the 2000/2001 financial year.

The Council’s approach to agrichemical use with regards to discharges to land and water, has been non-regulatory. The preferred approach has been promotion of best practice methods.

Policy 4.2.20 and the associated method 6.4.3, recognise increasing public awareness of issues surrounding spray drift and pesticide use, and complement other methods within the Plan to educate agrichemical users in more effective use of sprays and possible alternatives to them.

This study aimed to investigate what successful alternatives to agrichemicals and agrichemical best practice initiatives were already being used within the Wellington Region and beyond. From this information it was hoped that viable products and methods could be identified for promoted within the Region, particularly in areas of conflict, or potential conflict between land users. The study also included a broader search for recent best practice information. This report includes recommendations for dissemination and promotion of the resulting information.

## 2. Objectives

Objectives set out in the study proposal were:

- Determine current practices of WRC staff (including reduced use & alternatives to agrichemical use)
- Determine current practices of district councils in the Region (as above)
- Determine workable alternatives used by WRC & TLAs that could be transferred from specific current use to other target plants and/or situations
- Identify areas in the region where there is the most potential for non-target adverse effects, e.g. conflict between land users (organic farmers, horticulturists, vineyards, lifestyle block owners etc.), chemical use near sensitive receiving environments
- From these “hotspot” areas, identify target audiences for dissemination of information on agrichemical alternatives
- Identify commonly used agrichemicals and/or application methods with high potential for off-target effects
- Identify the best methods of dissemination

### 3. Methods

- Interviews with WRC staff regarding their use of agrichemicals and alternative methods used, including identifying:
  - which methods are successful; and
  - what could be transferred to other target species, situations.
- Interviews with appropriate District Council staff within the Region regarding controlled use of agrichemicals and alternative methods used, including identifying:
  - which methods are successful;
  - what could be transferred to other target species, situations; and
  - what would be the most appropriate ways to disseminate information.
- Background research into methods and products used, and studies undertaken by other agencies nation-wide, including:
  - internet searches;
  - contact with other local authorities; and
  - other contacts as identified.
- Interviews with WRC staff and interest group representatives to identify:
  - where the potential hotspot areas are (in terms of high agrichemical use and/or conflict);
  - potential target audiences for information gathered; and
  - most appropriate ways to disseminate information.

## 4. Results

### 4.1 Current practices by territorial local authority staff & contractors in the region

#### 4.1.1 Territorial Local Authority Staff

- Of the eight territorial authorities (TLAs) contacted, only Masterton District Council said they had a policy to use more environmentally friendly alternatives to agrichemicals. However, all council staff spoken to were aware of public pressure to **avoid adverse effects** of chemicals, and many had initiated programmes to reduce agrichemical use in their departments. Of those, many also cited the issue of **staff health** as being of importance. All authorities cited **cost effectiveness** as being of major importance in the selection and use of products/methods.
- Examples of reduction in use of chemicals or better application methods include the use of **pyrethrum/garlic pesticides** and good **plant health practices**, such as **organic fertilisers** and use of **mulch** (Carterton District Council). Individual Wellington City Council staff also use **Yates Greenscape** rather than Roundup. Wellington City Council, along with Hutt City Council and Masterton District Council also promote the use of **Weed Balls** (direct herbicide applicators) rather than spraying of chemicals wherever practical.
- Wellington City Council botanical garden staff have initiated a pesticide reduction programme stemming from a city-wide pesticide use review by their Council in 1994<sup>1</sup>. The programme has seen the establishment of an active IPM (**Integrated Pest Management**) group, and an approximate 60% reduction of chemicals in the rose garden in the past three years. All pesticides used are in the two lowest hazard classifications (4: Harmful substance & 3: Poison<sup>2</sup>). Weed control is managed by use of Roundup, although the amount of this herbicide that is used is reduced by use of mulch to inhibit weeds. Staff are trialling a mix of Roundup and vegetable oil to further reduce the amount of Roundup used, with an initial aim of a reduction of 25%.
- Carterton District Council (CDC) has trialled **wildflowers along roadsides**, to reduce the amount of spraying and/or mowing needed. So far the project has received considerable public approval, particularly for aesthetic reasons (Jerry Rotman, CDC Recreational Services Manager, pers. comm.). CDC has also trialled **native roadside plantings** in one area, which they consider have not been a success, because the roadsides have height restrictions for vegetation (for general visibility and that of road markers). This means the sort of bushy plants that would have helped inhibit weeds could not be planted, so the area still needs weeding and/or spraying. Jerry Rotman also raised the point that attracting native bird species to the roadsides

<sup>1</sup> Ombler, Kathy. 1999.

<sup>2</sup> Novachem manual 2000/20001 : a New Zealand guide to agrichemicals for plant protection. 2000.

was not necessarily a sensible idea, as many would be killed by vehicles using the roads.

**Appendix 1**, contains complete results of TLA interviews.

#### 4.1.2 Contractors

- Excell Corporation (who contract to Hutt City Council and Upper Hutt City Council) cited various methods they have employed to reduce pesticide use. These include good plant management, such as “**right plant right place**”, heavy use of **mulch, high density planting** and maintenance to “break the weed cycle”, and managing **grass**. The company trials new products / methods on its own initiative and from clients’ requests. Although the company has trialled some **fatty acid products** they weren’t impressed”. However, one staff member did indicate his trials had taken place during the winter, which is the worst time to be using these products, according to experiences from Auckland City Council and product promotional information. The company indicated that when chemicals are used, they are used judiciously, including using **direct application** (like Weed Balls) wherever practicable. Excell noted **clients’ demands for more accountable chemical use**, with contracts being let on an “attributes weighting”, i.e. not just cost effectiveness but also best practices procedures etc.
- Wellington Weedsprayers (who contract to Wellington & Hutt City Councils) use their own **hot air system** for WCC (which had been “non-chemical for approximately 8 years”), and **Weed Balls** for Hutt City. The company had previously held a contract to use the Waipuna **steam system**, but had since developed its own thermal system, which is a gas burner with moist air to prevent fire. The company has two units set up for WCC, but do not have the resources to undertake private work.

#### 4.1.3 Other agencies

- *AgResearch* experiments on the efficacy of **Yates Greenscape fatty acid herbicide** showed it to be more effective on young plants, with two applications about 3 days apart significantly increasing the effectiveness of the herbicide. The most effective concentrations are between 3 and 10%<sup>3</sup>.
- *Auckland City Council* implemented **non-chemical roadside vegetation control** in July 1999. A 12 month review report charts progress of the implementation of a 95% chemical-free programme, and concludes that the programme had been relatively successful<sup>4</sup>. After, some trial and error with methods and products, an effective programme was produced involving a combination of manual, mechanical and organic spray (i.e. fatty acid herbicides) methods. Public education was necessary to encourage acceptance of the odour

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<sup>3</sup> James, T.K. & Rahman, A. 1992.

<sup>4</sup> Auckland City. 2000a.

associated with the organic sprays. On-going modification to the programme should see improved performance.

- *Christchurch City Council* has also initiated a “chemical minimisation” programme, which uses gas burners for weeds in pathways, Greenscape herbicide and biological control agents<sup>5</sup>.
- A *North Shore City Council* stormwater report recommends planting grasses or other appropriate plant species in drains rather than spraying, to reduce erosion and flooding<sup>6</sup>. The report also promotes retention of native scrubby species for biodiversity and aesthetic management of roadside vegetation.
- Another urban weed control study focussing on high priority urban weeds trialed non-spray herbicide application techniques such as **gel pruning**, **cut stump painting**, and **herbicide rollers**. The study concluded that non-spray techniques are useful for selective weed control in sensitive areas<sup>7</sup>. Further studies involved development of a herbicide gel for control of woody weeds such as Old Man’s Beard<sup>8</sup>.
- *Hort Research* is also undertaking trials for non-spray techniques for herbicides, as well as foliar applications of alternative-type products like Yates Greenscape and Interceptor. They hope to be able to provide guidelines (for general circulation) for controlling weed species using non-spray techniques within a couple of years<sup>9</sup>.
- The *Institute of Natural Resources*, Palmerston North, has trialed **herbicide wiping devices**<sup>10</sup>, outlining most effective practices for use of Weed Ball and Turf Girl products.
- *Ministry of Agriculture and Forestry (MAF)* researchers compared a range of organic pest control agents with conventional pesticides. They found **pyrethrum**, **sunlight soap with vegetable oil**, and **Bettacrop** all had success in different circumstances<sup>11</sup>.
- *Marlborough District Council* has a joint venture project with *HortResearch* and a grape growers’ consortium on a **sustainable viticulture** project which has sustainable management funding for three years (the project is currently in its second year). The project is very research-based and has three main objectives: a) to reduce the use of herbicides and pesticides, b) to reduce water usage, and c) to improve general soil and plant health. This is done through the use of mulches from organic waste stream by-products from the vineyards. There are now almost two years of results showing positive trends, including financial savings from the reduction in pesticide use (Dion Mundy, HortResearch, pers. comm.)

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<sup>5</sup> Ombler, 1999.

<sup>6</sup> Nagels, Peter. 2000.

<sup>7</sup> Ward, B.G., Henzell, R.F., Holland, P.T. & Spiers, A.G. 1999.

<sup>8</sup> Ward, B.G. and Henzell, R.F. 2000.

<sup>9</sup> Ward, Brian. 2000. Personal communication (E-mail contact) 14.11.00.

<sup>10</sup> Harrington, K.C., Hood, M.Z., & McKinnon, K.C. 2000.

<sup>11</sup> Van Epenhuijsen, C.W., Wright, S, & De Silva, H.N. 1992.

- Trials using **organic and green mulches** for weed control in apple orchards showed that straw gave the most consistent control over a 6 year period<sup>12</sup>. Other trials include using mulch to inhibit insect pests in organic cauliflower crops, which found that mulching decreased plant damage and the incidence of aphids<sup>13</sup>.
- Roadside management trials include sowing **wildflowers** in Waikato and lucerne near Turangi, which provide low maintenance ground covers<sup>14</sup>. Transit NZ and AgResearch are trialing **low growing grass species** with the intent of reducing the amount of roadside vegetation control required<sup>15</sup>. Transit is also trialing wildflowers in Northland and Auckland with some success, however they recognise that more environmentally sensitive areas are not suitable for wildflower berms<sup>16</sup>.
- Various forms of **Integrated Pest Management (IPM)** systems are being undertaken within the different industry sectors to reduce agrichemical use by utilising **bio-controls**, targeting specific chemicals and better management. These industry initiatives include berryfruit (IPM<sup>17</sup>), pipfruit (Integrated Fruit Production<sup>18</sup>), kiwifruit (Kiwigreen environmental pest management system<sup>19</sup>), viticulture (Integrated Winegrape Production, currently representing over 60% of vineyard area nation-wide<sup>20</sup>) etc. IPM systems involve intensive monitoring for major diseases and pests, so that when agrichemicals are used, they are used on an **“as needed” basis**, rather than as a prophylactic regime. Thus it is possible to reduce the amount of chemicals applied while maintaining or even increasing (through reduced chemical expenditure) the economic return<sup>21</sup>.
- **Bio-Gro** does not recommend “quick-fix” type solutions. They believe in promoting a change of mindset towards understanding and implementing a **holistic** perspective, rather than expecting a cure for a symptom. Sprays allowed under Bio-Gro certification are for last resort use only, after other management practices have not had sufficient control. All products must be of natural origin, i.e., not synthetic pyrethroids, etc. BioGro does not recommend products like Greenscape, because these achieve a blanket kill and are symptomatic cures. This is inappropriate according to BioGro’s philosophies, which recommend nurturing a balance of pests/predators to establish, to ensure control rather than eradication.
- Some garden centre staff, who were contacted to ascertain the availability of certain products, commented on the accessibility of hazardous chemicals available in supermarkets. The concern was

<sup>12</sup> Hartley, M.J. & Rahman, A. 1998.

<sup>13</sup> Lovei, G.L. & Bycroft, B. 1992.

<sup>14</sup> Wheeler, Chris. 1999.

<sup>15</sup> Anon. 2000b.

<sup>16</sup> Anon. 2000c.

<sup>17</sup> <http://www.hort.cri.nz/berryfruit.htm> (25.11.00)

<sup>18</sup> [http://www.enza.co.nz/1\\_pipfruit/frame.asp?topic=1\\_7-environment](http://www.enza.co.nz/1_pipfruit/frame.asp?topic=1_7-environment) (25.11.00)

<sup>19</sup> <http://www.zespri.co.nz> (25.11.00)

<sup>20</sup> <http://www.nzwine.com/intro> (25.11.00)

<sup>21</sup> HortResearch. [1999?].

raised that members of the public buying pesticides from these sources would have limited access to education on safe use of them.

#### 4.2 Effective methods and products

- **Fatty acid herbicides:** used with some success in Auckland City Council’s chemical reduction programme. The products are most effective in the Nov-March growing season, i.e. they need to be used in hot weather. They are not generally as cost effective as Roundup; they need more frequent application, but are used by individual staff (on preference) at WCC.
- Maintenance of plant health through use of **organic fertilisers** increases immunity to pests and diseases.
- Good plant management including “right plant right place”, heavy use of mulch, high- density plantings and maintenance to “break the weed cycle”, not mowing turf too short or allowing it to get too long.
- Use of **mulch** to reduce weeds (while conditioning soil etc) has been successfully trialled in orchards, vineyards and garden situations. Research has shown that mulch increases aeration of soil, which improves root and plant vigour<sup>22</sup>.
- Various pesticides and fungicides made from combinations of **pyrethrum, garlic, compost tea, seaweed tea, baking soda, etc** are effective when used in combination with good plant management to maintain plant health.
- One pesticide found to be effective for aphids and whitefly is Chess, a low toxicity classified chemical, registered to be appropriate with IPM systems.
- **Vigilant gel** is a new picloram-based herbicide developed by Hort Research. It has a low toxicity rating and is directly applied to cut stumps of woody weeds, e.g. old man’s beard, privet, barberry etc. It is currently being trialled by WRC biosecurity staff.
- Weed burners and Weed Balls were found to be effective on hard surfaces (e.g. paved areas, curbing etc), while burners were not effective on woody weeds.
- Kate Kidman (Wellington Botanical Gardens) believes successful IPM (or any chemical-reduced regime) requires a more holistic approach, including understanding the life cycles of the plant and animal pests requiring control and adequate monitoring of situations. Any chemicals used need to be very pest specific, so as not to harm beneficial insects and bio-control agents.

**Appendix 2** (Tables 1-3) sets out specific products and methods.

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<sup>22</sup> HortResearch. [1999?].

## 5. Potential Conflict Areas and Target Audiences

### 5.1 Pesticide use

A MAF Policy technical paper on trends in agricultural pesticide use shows a decline in the amount of agrichemical use nation-wide since 1994. This decline is attributed to changes in land use, cost-effectiveness of certain chemicals, and the adoption of IPM regime<sup>23</sup>. It is likely that these influences and trends apply in the Wellington Region. Nation-wide, herbicides account for approximately 68% of pesticide use (with chemical weed control continuing to be the most cost-effective technology), while fungicides account for 24% and insecticides 8%. The highest-use herbicides are Phenoxy-hormones (24%), e.g. 2,4-D, and Phosphonyls (26%), e.g. Roundup<sup>24</sup>.

There is little in the way of detailed data for pesticide use in the Wellington Region. However, a variety of data from national and regional organisations were used for a biogenic emission inventory prepared for the Council in June 2000<sup>25</sup>. This study shows more intensive herbicide and insecticide use within the Masterton, Greytown and Otaki areas, corresponding with the horticulture and pipfruit land uses. A national AC Nielsen survey suggests there is little difference in pesticide use between dairy and sheep and beef farming<sup>26</sup>, however the biogenic emission study indicates a considerably higher use of pesticides in areas with above average proportions of dairy farms<sup>27</sup>.

The study showed a trend consistent with national usage, i.e., herbicides accounted for approximately 63-69% of the total agrichemicals used, and herbicides associated with pastoral farming and exotic forestry accounting for approximately 93% of that figure. The other land use type that used a high proportion of agrichemicals was apple production, which accounted for approximately 45% of all insecticides used in the Region and approximately 46% of all fungicides.

Approximately 57% of total land cover in 1998 was classified as “primarily pastoral” and “planted forest”<sup>28</sup>. Data showing the relatively high use of Phenoxy-hormones (e.g. 2,4-D) is consistent with the high proportion of herbicides used in pastoral farming. These types of herbicide are highly volatile and have the potential for serious off-target effects via spray drift (Lynette Wharfe, VegFed, pers. comm.).

### 5.2 Conflict areas

The Wellington Regional Council has not received many public complaints that would indicate significant conflict with agrichemical use in the Region<sup>29</sup>. Of the

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<sup>23</sup> Holland, P. & Rahman, A. 1999.

<sup>24</sup> Holland, P. & Rahman, A. 1999.

<sup>25</sup> Noonan, Mathew, Garrett, Nick & Hally, Vera. 2000.

<sup>26</sup> AC Nielsen. 1999.

<sup>27</sup> Noonan, Mathew, Garrett, Nick & Hally, Vera. 2000.

<sup>28</sup> Wellington Regional Council. 1999.

<sup>29</sup> Hooper, Kathryn. 2000.

complaints received by the Council's Wairarapa office, more stem from pastoral farm agrichemical use than from horticulture or lifestyle blocks (Stephen Yeats, Wairarapa office, pers. comm.). Representatives spoken to from interest groups such as the Smallfarmers Association did not identify any significant areas of conflict.

However, anecdotal evidence suggests that some areas of intensive horticulture, orchards and viticulture are likely to experience conflict between land users. There is potential for conflict in rural areas that have been subdivided into smaller lifestyle blocks, thus increasing population density, as well as potentially conflicting land management practices. It is also possible that some lifestyle block owners lack experience and knowledge regarding appropriate agrichemical use.

There is also potential for conflict within urban areas, where neighbours are spatially closer and the effects of off-target agrichemical use could be equally as devastating as in rural areas. Agrichemicals are easily available in shops and supermarkets and uneducated users have the potential to cause considerable damage to neighbouring properties. The reduction, or more judicious use of agrichemicals is a concern of all territorial local authorities spoken to, prompted by public pressure and tighter legislation (e.g. OSH and ACC

### 5.3 Target audiences / interest groups

Given that **pastoral farming** accounts for most of the agrichemicals used in the area, as well as using a high proportion of volatile herbicides, these land users are an obvious target for promotion of alternatives to agrichemicals. Method 6.4.5 of the Regional Air Quality Management Plan already targets safer application methods of agrichemicals through promotion of GROWSAFE courses. Currently compliance staff in the Council's Wairarapa office recommend different application methods to reduce off-target effects, such as weed wipers and granulated chemicals (Stephen Yeats, pers. comm.).

Recent figures show that the number of **lifestyle blocks** nation-wide has reached 100,000<sup>30</sup>. This trend of subdividing land for lifestyle blocks, along with diversifying land use from conventional pastoral farming to include more intensive and/or sensitive regimes such as viticulture and organic farming, could result in increased conflict between agrichemical users and their neighbours. An initiative in Wairarapa to promote the area as an organic region<sup>31</sup> may see an increase in conflict between organic and non-organic land users and thus an increased need for information on alternatives to agrichemicals. In the urban setting, some small interest groups promoting sustainable urban lifestyles already exist, including well attended workshops at a Lower Hutt residence<sup>32</sup>.

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<sup>30</sup> Smithee, Paul. 2000.

<sup>31</sup> Martin, Marie. 2000.

<sup>32</sup> McNicholas, Marie. 2000.

Interest groups identified as likely to respond to further contact and provision of information, with Regional contacts included wherever possible, include:

- BioGro - 801 9741. Although the organisation does not see itself as a technical advisor, a need has been identified for them to supply technical information to farmers <sup>33</sup>.
- Farm supply shops & Garden centres. These could have leaflets available for customers, promoting either alternative methods/products or safer application methods for agri-chemicals.
- Federated Farmers: Roger Barton (Wairarapa president "Stonestead", Woodside, RD1, Greytown, 5953. Tel (06) 304-9495. Fax (06) 304-8495. Mobile (025) 415-268. Email: [rogbar@xtra.co.nz](mailto:rogbar@xtra.co.nz)).
- Otaki lifestyle farmers field days: Annual event at Otaki. Contact Peter Burke ph: (025) 2242184; email: peterblevin.tl.net
- Pesticide Action Network: (Alison White) C/- Toxins Action Group, P O Box 43199,

Wainuiomata.

- Pipfruit growers: Richard Butler, Chatswood Orchard RD8 Masterton, Ph: (06) 378 2050 or Andrew Wright (06) 304 9920.
- Smallfarmers Assn: Sandy Cooper (Wellington, ph (04) 526 9540 ), Diane & Ian Grant (Wairarapa, ph. (06) 3771359).
- Sustainable Wellington: Mike Ennis, Home ph: (04) 387 1100, Work ph: (04) 471 2755. This organisation has a very useful website, which currently has a link to Environment BOP's weed page. The website is to be upgraded soon, with more information about organic methods, so the organisation is keen to promote links and/or information from this study on their website.
- Urban lifestylers: Pamela McDowell (ph: 04 5697134) runs sustainable living workshops at her home in Lower Hutt.
- VegFed representatives: Otaki – John Griffin (president) (06) 364 5469, (025) 442556; Andrew Yung (secretary) (06) 3643256, (021) 570597. Wairarapa – Bruce Slater (president) (06) 3049863, (025) 463252; Jeff Warburton (secretary) (06) 3049361.
- Vineyards: Palliser Wines (contacted re NZWIM regime) (information may come later from Sharon Goldsworthy (06) 3069019, [sharon@palliser.co.nz](mailto:sharon@palliser.co.nz) ). ALSO HortResearch contact for Marlborough study: Dion Mundy [dmundy@hortresearch.co.nz](mailto:dmundy@hortresearch.co.nz)
- Wairarapa Organic Farmers: Stephen Wyllie, 324 High St South, Carterton. Ph (06) 3798507; email: [potager.plot@xtra.co.nz](mailto:potager.plot@xtra.co.nz)

A study on the information sources and needs of organic farmers identified that these farmers were inclined to gather information from fellow growers and officials of the certifying agencies <sup>34</sup>. It is likely that this method of information sourcing is also applicable to traditional farmers. Therefore the most appropriate

<sup>33</sup> Rahman, Mohammad Afreen. 2000.

<sup>34</sup> Rahman, Mohammad Afreen. 2000.

ways for the Council to promote information about alternatives to agrichemicals to rural landowners is likely to be at workshops and field days where general discussion and sharing of information and experiences would also benefit the Council.

## 6. Potential Approaches To Promoting Alternatives To Agrichemicals

### 6.1 Information resources

This study investigated successful methods and products that could be promoted to conflict areas within the Region. It was notable that a desire to work towards a reduction of and/or safer agrichemical use is a priority for most people and organisations contacted. There were two main incentives for this reduction of agrichemical use. Firstly, industry demands for a “clean, green” product and secondly, health and safety issues where significant hazards are need to be identified and minimised.

It also became clear that while there are certain alternative products and methods, these are quite often situation-specific. Generally, WRC and TLA staff experience stems from practices specific to their own situations, thus their knowledge and expertise cannot necessarily be transferred to other situations.

A range of information and sources that can be used as a reference guide for Council officers is presented. Information about alternative products and application methods is presented in **Appendix 2**. This could be used as the foundation for promotional materials. The appendix will need to be updated to accommodate any new information resulting from research carried out by research institutions, such as HortResearch. Research has shown that information from these institutions often does not reach farmers effectively<sup>35</sup>. The Council could play an intermediary role by disseminating information through established contacts.

Several people spoken to highlighted the need to educate agrichemical users, including reduction of reliance on agrichemicals as well as reduction of off-target effects. Given the general availability of agrichemicals, this education should be aimed at all users, including those in urban, residential gardens. Many research institutions and industries nation-wide are already investigating methods and products as alternatives to agrichemicals, although hard data from these trials are likely to be some years away from publication. However, if Council kept up to date with the results of these trials, possibly using the contacts established during this study, the detailed information available for promotion could be added to and up-dated whenever necessary.

### 6.2 Holistic approach

On a broader scale, the underlying ethic behind most systems employing alternatives to agrichemicals is a holistic approach to land use. While it is not appropriate for the Council to advocate wholesale conversion to organic systems, there is much to recommend about those systems. The holistic ethic of organics requires land users to look beyond a “quick fix” symptomatic approach to problems, towards a better understanding of plant and animal life cycles (both pest and beneficial biota) including increased plant health.

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<sup>35</sup> Rahman, Mohammad Afreen. 2000.

Promotion of alternatives to agrichemicals by necessity includes promotion of a more holistic approach to land use management, i.e. it is not necessarily appropriate to replace a chemical product with a non-chemical one, without understanding why such a product is needed. Promotion of holistic, sustainable land use practices (e.g. ensuring good soil health, appropriate plantings for the situation, and use of mulch to reduce weed growth) in itself is likely to reduce dependence on agrichemicals.

A group of organic farmers in Wairarapa is working to promote the Region's burgeoning organic industry. It is timely for the Wellington Regional Council to support this movement, within its functions regarding the promotion of sustainable land management within the Region. Continuing reliance on agrichemical use is not sustainable environmentally, as evidenced by the growing moves by industry sectors to promote IPM systems. The Council could therefore work to maintain links with the industry and research sectors to promote their findings within the Region.

A MAF policy position paper has outlined possible benefits of organic farming<sup>36</sup>. These include lower leaching losses of nitrogen and potassium, enhanced soil fertility through tighter nutrient cycling, higher levels of organic matter in soil etc. These improved conditions would benefit many aspects of the Council's concerns, not just air quality.

The Council therefore is in the position to take a proactive stance to minimise potential conflict and promote sustainable land management within the whole Region, to both urban and rural land users. Using the interest groups and specific information resources identified in this study, the Council could support organic initiatives already underway while also using its advocacy functions to promote holistic land management practices.

This section can be shortened/tightened up to state a couple of key points:  
 Holistic approaches use less chemicals  
 MAF policy report shows wider environmental benefits of holistic approach  
 These issues/benefits are all the concern of WRC (i.e., not just air quality)  
 Therefore, WRC should support holistic approaches like IPM and organics (this is a recommendation)

### 6.3 Promotion to Territorial Authorities

All the Territorial Authorities contacted for this study undertake some form of roadside weed control. Of those, it appeared that urban councils implement alternative systems more than the rural councils. Rural council staff often referred to the significant extent of roadsides needing management compared to the population/rates base, and their lack of economic wealth. The rural councils are using agrichemicals to manage roadsides, because they see this as more cost effective way than the use of alternative products and methods. It is possible that rural residents in general are more accepting of the use of agrichemicals.

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<sup>36</sup> Manhire, Jon & Soper, Geoff. 1994.

In order to reduce agrichemical use and potential effects on the environment, it will be necessary to look for alternative roadside management methods that reduce expenditure on agrichemicals. For example, it may be that roadside vegetation does not need to be controlled at all. Grass seldom grows high enough to be too high for height restrictions.

Native roadside plantings may be another financially viable alternative. Short, bushy shrubs, densely planted, would not only inhibit weed growth, but also increase native habitat. Native plants sourced locally are suitable for the growing conditions and should not require intensive management. While one such trial in the Carterton District has not been viewed as a success, further trials should be encouraged. This is an area that the Council could promote to TLAs, possibly as a joint scheme utilising Regional Council expertise and resources such as the Akura Conservation Centre.

Many TLA staff commented on the need to spray along waterways, as mechanical clearing was too expensive and chemical application methods such as weed balls need a paved surface, which is usually not available in water tables. Encouraging native plantings along riparian margins reduces the need for weed management such as chemical spraying, while also increasing stream/waterway health, through increased shade, cooler water temperatures, reduction of run-off and associated pollutants etc, while increasing amenity values in the district. This would also be appropriate for Method 6.4.4 of the Plan, which seeks to reduce adverse effects of the use of agrichemicals.

It is recognised that encouraging adoption of new approaches is a long term task and there is potential for conflict with local authority staff. However, promotion of management systems for roadsides that reduce discharges of agrichemicals to waterways and air through roadside spraying, falls within the Council's interests and concerns. It is also consistent with other approaches promoted by other Regional plans. Additionally, it is important for the Council and constituent TLAs to lead by example. The public do not necessarily make a distinction between the practices of a TLA and those of the Regional Council.

## 7. Conclusions

There has been a nation-wide reduction in agrichemical use in the past few years, which is indicative of a widespread concern to reduce potential adverse effects on people and the environment. Most people contacted for this study expressed a desire to reduce their use of agrichemicals, or were at least open to hearing more information on methods and products available. Therefore, the Council should align itself to those organisations already reducing their agrichemical use and/or undertaking best practice methods, with the aim of supporting such initiatives. Cost effectiveness was a major concern for many participants, particularly local authority staff who are publicly accountable for their expenditure. Many had tried alternative products but found them too expensive. Council support could therefore encourage further investigation into appropriate products and practices.

While the Council receives few official complaints about agrichemical use, this study has identified some potential conflict areas that could be targeted for promotion of alternative methods and products. The growing trend of more intensive rural land use through subdivision into lifestyle blocks and farm diversification creates more potential for conflict relating to agrichemical use. The Council could take a more proactive approach to promotion of alternatives to agrichemicals, with the aim of avoiding some potential conflict. Specific land use types that are most appropriate to target are pastoral farming, lifestyle block owners, vineyards and urban gardeners, while useful contact could be maintained with organic growers' groups.

Many research and other institutions within the country are experimenting with alternative products and/or better application methods for agrichemicals. While results are unavailable as yet, the amount of research in this area echoes the concern expressed by many people. It is an area that the Council could keep abreast of and thus be in a position to disseminate new information as it comes to hand.

Much of the information found during this study is situation specific and detailed information has been recorded for later use as educational and advocacy material. Potential target audiences and supportive organisations have been identified and contact details supplied where available. There are various ways the Council can promote the use of alternative methods and products, including through its own publications and website, as well as through interest groups and community organisations for rural and urban residents.

A strong message to come out of this study, was the need for a holistic approach when reducing agrichemical use, rather than merely substituting one "quick fix" product with another (albeit less toxic) one. A programme to promote holistic land use practices would align with the Council's requirements to achieve integrated management of natural and physical resources under the Resource Management Act 1991. This would not be a short term strategy, but would bring together several topics of Council concern, such as, better soil structure and riparian management.

## 8. Recommendations for Advocacy

- Promote alternative roadside management systems to TLAs, particularly appropriate native plantings.
- Offer support, by way of information dissemination, workshops, networks, etc to the fledgling Wairarapa organics group, in their quest to encourage the area's potential as an organic region.
- Promote general information to the identified target audiences through the following methods:
  - Posting on the WRC website
  - Articles in publications such as: Elements, interest group journals (e.g. Smallfarmer and Lifestyle magazine), local urban newspapers
  - Interest group websites, such as, Sustainable Wellington, Smallfarmer, Lifestyle Block etc.
  - Pamphlets for general distribution to ratepayers, service centres, farm supply stores etc. Specific product and method information, as detailed in Appendix 2 may be more appropriate for pamphlets, rather than articles promoting a holistic approach.
  - Workshops and field days: probably most useful if targeted to interest groups. Venues such as Taratahi Agricultural Training Centre have their own networks for advertising events, while the annual Otaki lifestyle farmers field days have a strong following.
- Foster communication with industry groups working on IPM and associated regimes, to gather and disseminate information, as well as benefiting from established networks.
- Keep up to date with new research (e.g. current trials at Hort Research) to add new products and methods to tables already compiled.
- As part of the Council's environmental education programme, include a sustainable land management programme which would include promoting alternatives to agrichemicals and target land users and interest groups identified from likely conflict areas. Possibly a subset of Landcare groups could be set up, specifically for organic promotion.

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## Appendix 1

	<b>CDC:</b>	<b>HCC:</b>	<b>KCDC:</b>	<b>MDC:</b>	<b>PCC:</b>	<b>SWDC:</b>	<b>UHCC:</b>	<b>WCC:</b>
<b>Policy for alternatives</b>	No, although individual staff try to reduce use from own initiative, staff health benefits etc.	No, management directive to be as environmentally friendly as possible, from public pressure	No; but management practice to try and reduce	Policy to use more environmentally friendly chemicals & reduce off-target effects	No	No	No, but doesn't encourage chemical use. Roadside spraying on as needed basis only	By default: alternative system rolled over after Waipuna Steam method
<b>Areas chemicals used</b>	Parks, reserves, roadsides etc (Buster, Round Up, Simazine)	Parks, reserves, roadsides etc	Parks, reserves, roadsides etc	Parks, reserves, roadsides etc	Parks, reserves, roadsides etc	Parks, reserves, roadsides etc	Parks, reserves, roadsides etc	Parks, reserves, roadsides etc
<b>Staff or contractor</b>	Staff	Contractors: Wellington Weedsprayers (roads) & Excell Corporation (horticultural areas)	Hayes Spraying services	Both	Both. Contractors are used for larger areas (for cost effectiveness)	Contractors (Ground spray services; Alan Johnston vegetation control; Serco Services)	Roads: Hayes Spraying; Reserves and gardens: Wellington Weedsprayers & Excell Corporation.	Staff & Wellington Weedsprayers
<b>Promotion of alt. methods or products?</b>	Horticultural area: use mostly pyrethrum/garlic sprays; some end of season fungicide use. Nursery uses some insecticide. Reduction in need for pesticides by use of organic	Yes, promoted Weed Ball over spraying	Trialed Waipuna system for roadsides, but found ineffective. Now use methods to retain droplet size etc. Reserves only spray when necessary, don't have specific programme	Have trialed fatty acids etc. Also use Weed Ball instead of spray where ever possible, and / or wands, handheld sprayers	Have trialed different methods, including different spray nozzles appropriate to job and Weed Ball	No. Have returned to spraying watertables for e.g., because of cost effectiveness (\$40/km for spray vs \$600/km for digger, also spray less often); spraying	Contractor required to mow up to edge of council buildings (not spray). Roadside spraying: contractor required to use non-residual spray, does not spray frontages obviously maintained by property owners	Chose hot air system, also Weed Balls preferred over spray where applicable. Staff members chose between Roundup or Greenscape

	<b>CDC:</b>	<b>HCC:</b>	<b>KCDC:</b>	<b>MDC:</b>	<b>PCC:</b>	<b>SWDC:</b>	<b>UHCC:</b>	<b>WCC:</b>
	fertilisers and heavy mulch					contractor is 1-person operation, thus more cost effective. No use of Weed Balls.		
<b>What would “sell” products or methods?</b>	Cost effectiveness, e.g. too small a council to afford to bring over alternative systems from Wellington	Cost effectiveness and public pressure	General and cost effectiveness of product	Longevity of effectiveness (i.e. to compete with Round-up effectiveness of 2-3 months) and cost effectiveness	Cost effectiveness, including less labour intensive	Cost effectiveness - small council, so not wealthy. Also not too much pressure from public to reduce spray	Cost effectiveness mostly (but reserves staff err mostly on side of reducing social and environmental impact)	Cost effectiveness
<b>Does authority have “no spray reg.”?</b>	Not officially, but very small authority, so know who objects and work around them	Yes, some dropped off since Weed Ball regime	Yes	Yes, approximately 15-20		Yes (although some don't maintain verges as required). Also very careful around vineyards (I.e. reduced spray in adjacent reserves and roadsides)	Yes, approximately 50. But doesn't include people who maintain own frontage regardless	Yes, applicable because use of spray near watertables, accessways etc
<b>Most effective dissemination for info?</b>	Report of successes	Demonstration of product, method. Written information of trials	Report of independent successful trials		Demonstration	Trial results, but because of length of time of contracts (e.g. 3 years), wouldn't necessarily change methods immediately.	Written information	Written information, or workshop if range of products and methods

<b>Name</b>	<b>Authority</b>	<b>Dept./position</b>	<b>Phone #</b>	<b>Date contacted</b>
Jerry Rotman	Carterton DC	Rec. Services Man.	(06)3796626	13.11.00
Aaron	Hutt CC	Leisure services	5706666	26.09.00
Clive Robertson	Hutt CC	Contracts man.	5706865	26.09.00
Geoff Strand	Kapiti Coast DC	Roading	(04)2985139	25.10.00
Mark Bruhn	Kapiti Coast DC	Parks & rec.	" "	16.10.00
Linda Kenny	Kapiti Coast DC	Env. Health	" "	02.10.00
Mark George	Masterton DC	Parks asset man.	(06)3789666	25.10.00
William Middleton	Porirua CC	Parks	2375089	02.10.00
Ian Richards	South Wairarapa	Contracts eng.	(06)3069611	25.10.00
Craig Coxall	Upper Hutt CC	Parks & Res	5272169	16.10.00
Patrick Hanaray	Upper Hutt CC	Roading engineer	5272169	17.10.00
Garth Nixon	Wellington CC	Contracts man.	3890255	02.10.00
Mike Oates	Wellington CC	Bot. gardens	8013072	26.09.00
Neil Christensen	Wellington CC	" "	8013073	16.10.00
Kate Kidman	Wellington CC	" "	4730698	17.10.00

### **Contractors**

Chris Close	Manager	5765000	17.10.00
Athol Sanson	Hort. Team man.	(025)380705	17.10.00
Glen Bonn		9399333	02.10.00

## Appendix 2

**Table 1: Product Information**

Product	Pest / Results / Recipes	Product Source
Baking soda	Use for powdery <b>mildew</b> & <b>black spot</b> . Works better if as much mildew as possible is hosed off first (2g baking soda to 1L water, spray often)	Supermarkets
Beat-a-bug	Natural insect spray made up of : <b>Garlic</b> - this repels insects when sprayed onto plants (which deters them from coming back) <b>Chili</b> - the Chili irritates the insect's stomach and acts as a catalyst in the action of the Pyrethrum <b>Pyrethrum</b> - this actively paralyses many different insects - but unlike many insecticides it is non-toxic to mammals.	<a href="http://www.garden-nz.co.nz/home.asp">http://www.garden-nz.co.nz/home.asp</a> Some garden stores
Bettacrop (Fungal deterrent; garlic & pyrethrum spray)	*High kill rate of <b>Froggatt's apple leafhopper</b> , good organic control *Good reduction of <b>Apple leaf curling midge</b> in late season * One of the best organic sprays for <b>Long-tailed mealy bug</b> (not as effective as chemical spray)	Some garden stores, organic shops.
Bordeaux mixture	Organic <b>fungicide</b> using with copper sulphate & calcium hydroxide. Useful against <b>parasitic fungi &amp; bacteria &amp; downy mildew</b>	
Bug juice	<b>Recipe:</b> blend a handful of the pest requiring treatment (e.g. green vegetable bugs) with 2 cups milk/water. Allow juice to brew several hours, then spray over plants. Probably works by smell deterring pests while encouraging beneficial predator insects	
Chamomile & garlic spray tonic	<b>Recipe:</b> 1 crushed garlic clove & small handful chamomile flowers to ½ litre boiled water. Steep 12 hours, then spray as a plant tonic, to increase immunity from pests & diseases. Chamomile tea is also a mild <b>fungicide</b>	
Chess	For <b>aphids &amp; whitefly</b> . Low toxicity <b>pesticide</b> , compatible with IPM programmes	Farm supply shops
Chive tea	General <b>insect repellent</b> . Beware of repelling beneficial insects	
Compost tea	Handful of compost soaked in water. Use as <b>fungicide</b> sprayed on plants (can also use fish fertilizer or seaweed fertilizer teas in same manner)	Make from own compost, or Biofeed brand fertilizer – from garden shops, organic shops etc
Defender (+ oil)	With & without added oil. High kill rate of <b>Froggatt's apple leaf hopper</b> , good organic control without need for pyrethrum	

Product	Pest / Results / Recipes	Product Source
DeeWeed	Biodegradable fabric (wool) <b>mulch</b> . Degrades within 2 years. Available in individual plant sizes and mat in rolls.	DeeWeed; 110 Sinclair Rd, Ararimu RD 3, Drury. <a href="mailto:peter@deeweed.co.nz">peter@deeweed.co.nz</a> ; also garden shops
Fatty acids generally  (along with mineral oils)	<ul style="list-style-type: none"> <li>* Effective <b>weed</b> control for 3-6 weeks (weather dependent);</li> <li>* c. 8-10 applications/year for adequate control;</li> <li>* 50/50 fatty acid/mechanical means more cost effective.</li> <li>* Weed Ball application not effective, but spraydrift not a problem (heavier viscosity), application slower because plant needs to be thoroughly covered.</li> <li>* As low strength dose for control of <b>aphids, greenfly, mealy bugs, mites, thrips &amp; whitefly</b></li> </ul>	Farm supply shops, some garden centres
Garlic spray	Natural <b>insecticide</b>	Garden shops, organic shops, <a href="http://www.oceanorganics.co.nz">www.oceanorganics.co.nz</a>
<i>Greenscape</i> (Yates) Hernicide	<ul style="list-style-type: none"> <li>* More effective on <b>young plants</b> (clovers and some grasses recovered from initial damage);</li> <li>* 2 applications 3 days apart most effective, most effective concentration 3-10%;</li> <li>* (Along with other fatty acids) more effective in hot weather; knapsack spraying most effective;</li> <li>* Product approx. 6 times the price of Roundup ;</li> <li>* Optimum time for application growing season – November-March;</li> <li>* Plants need full coverage of herbicide (as it's a desiccant) for good results; control achieved with regular applications NOT effective in winter;</li> <li>* Greenscape achieves most effective control with young, fast growing weeds. On perennial weeds and grasses use 100ml of Greenscape per litre of water. A second application after 3-5 days will assist control. Established perennial weeds are not well controlled.</li> </ul>	Some garden shops, farm supply shops  <a href="http://yates.co.nz/products/product.asp?product=273">http://yates.co.nz/products/product.asp?product=273</a>
Insect traps	Controls <b>leaf roller, codling moths, white fly, thrips, aphids, earwigs, slaters, vine hoppers</b> etc but NOT bees - uses tape to place around the trunks of trees to trap <b>crawling insects</b>	Ecostore <a href="http://www.ecostore.co.nz">www.ecostore.co.nz</a>
Interceptor	An emulsifiable concentrate essential oil. Less effective herbicide than Greenscape.	Ecostore <a href="http://www.ecostore.co.nz">www.ecostore.co.nz</a> Organic shops
Manuka tea	Spray on as <b>fungicide</b> . Make from fresh leaves, or from manuka oil.	Oil available from chemists and health food shops

Product	Pest / Results / Recipes	Product Source
Marigold tea	Repels <b>sap-sucking insects</b> & kills <b>aphids</b> .	
Milk spray	* Sour milk by adding 4 tsp. vinegar to 1 cup milk, allow to stand several hours before spraying. Acts as an <b>insect deterrent</b> * Milk diluted to 1 part milk to 9 parts water can be used effectively as a <b>fungicide for mildew</b> – spray frequently	
Milk & honey spray	1 part milk, 9 parts tepid water, then 1 part honey to 100 parts of milk/water mix. Spray for <b>stress of insect damage</b> etc.	
Natures Way insecticide	Greenhouse <b>whitefly</b> kill rate >90%	Some garden shops
Neem oil	Insecticide (e.g. for <b>whitefly, aphids, mealybug, scale etc</b> )	Ecostore <a href="http://www.ecostore.co.nz">www.ecostore.co.nz</a>
Oyster grit (Bettacrop)	<b>Deters</b> slugs & snails (also crushed egg shells, sand, ash etc)	Bettacrop stockists - organic shops, some garden shops
Pyrethrum (incl. Yates)	* <b>Good reduction of Apple leaf curling midge infestation, early &amp; late season.</b> * One of the best organics for <b>long-tailed mealy bug</b> but not as effective as chemical spray; *But toxic to beneficial insects too – spray at dusk, after bees stopped flying	Garden shops, farm supply shops
Safers natural concentrate	Greenhouse whitefly kill rate >90%	Garden shops
Seaweed spray	Fungus/foiar feed/virus/aphid spray; used regularly if feeds plants while protecting against brown rot, black spot, curly leaf etc	<a href="http://www.oceanorganics.co.nz">www.oceanorganics.co.nz</a>
Slug & snail bait	Made from aluminium sulphate & sea salt which acts to dehydrate the slugs & snails	Ecostore <a href="http://www.ecostore.co.nz">www.ecostore.co.nz</a>
Three-in-one all purpose spray	<b>Insecticide/fungal &amp; bacterial</b> protection: garlic/pyrethrum & copper hydroxide	Make up from individual ingredients
Topgun (fatty acid) Herbicide	Repeat application (after 3 days) useful. Not very effective against sub-clover. Similar effectiveness to Greenscape	
Veg. Oil & sunlight soap	Good reduction of <b>Apple leaf curling midge</b> infestation, early & late season.	Supermarket
Vigilant gel (picloram chemical)	* Gel with active ingredient classed as non-scheduled hazard (bottom of scale). Needs to be applied to cut stems in fine weather. Registered for use on <b>Old mans beard, Japanese honeysuckle, climbing spindleberry, grey willow saplings</b> ; trials on other woody species currently underway. * Most effective ingredient in trials for old man's beard	Farm supply shops, some garden centres
Wood ash	Sprinkle fine ash around plants as a <b>pest deterrent</b> (e.g. slugs, snails)	

<b>Product</b>	<b>Pest / Results / Recipes</b>	<b>Product Source</b>
Worm drench	Worm drench for sheep (50/50 mix of garlic juice and cider vinegar)	Supermarket for individual ingredients
Wormwood tea	Recipe: Dilute tea with 1 part to 4 parts water; use as <b>insecticide</b> spray for aphids, whitefly, mosquitoes, moths etc. Leaves etc steeped in water for some days can be poured around plants to deter slugs & snails.	
Yellow cards	Hang yellow card covered with sticky substance like vaseline, in enclosed areas to attract flying insects	Stationery shops/ supermarket

**Table 2: Method information:**

Method	Results	Sources
General		
Control rather than eradication	<ul style="list-style-type: none"> <li>* Prevent dominant weed species: manage soil fertility, allow crops to out-compete; don't allow bare patches of soil for weeds to colonize.</li> <li>* Right plant right place, high density planting, regular maintenance to break the weed cycle</li> </ul>	
Flame weeders	<ul style="list-style-type: none"> <li>* Best on <b>annual weeds</b>. Large perennials need several treatments.</li> <li>* Can use in wet/windy weather.</li> <li>* Hand-held with gas bottle on wheels etc very easy to use</li> <li>* Good for <b>footpath edges, between pavers</b> etc</li> <li>* Be careful not to scorch plants.</li> </ul>	Ecostore <a href="http://www.ecostore.co.nz">http://www.ecostore.co.nz</a> Some garden & hardware stores
Interplanting	Avoid monocultures. This makes it harder for pests to find their target plants. Use plants like marigolds, onion, garlic, dill, mustard, tansy, sage, thyme, mint, rosemary	
LPG/Hot air/Infra red	Similar effectiveness as flame weeders: all have vehicle mounted applicators for use on organic blocks	Turf Prep: PO Box 35-071, Christchurch Ph: 03 3854073
Mulch	<ul style="list-style-type: none"> <li>* Mulch matting like old carpet underfelt inhibits weeds, conditions soil for healthier plants.</li> <li>* Biodegradable, useful for sloping sites where bark, etc slips away (see also specific products like DeeWeed).</li> <li>* Also rock mulching (rocks take up solar energy during daylight, releasing it slowly overnight)</li> </ul>	
Regular maintenance	Don't allow areas to accumulate with debris, encouraging weeds to take root – e.g. in gutters	
Smother crops/green manure	Smother and <b>inhibit weeds</b> with lupins, mustard greens, oats and buckwheat. These can also be used as green manure	
Snail “tea”	Use as a <b>liquid fertilizer</b> . Foul smelling, but good soil food. <b>Also</b> use plant pests in the same way (well rotted).	
Steam	<ul style="list-style-type: none"> <li>* Handheld steam sprayers for gardens. Ok in wet weather, but limited by needing electricity supply. Good for spot weeding;</li> <li>* E.g. Waipuna steam system. Good for road edges etc. Weeds killed instantly. No smell. Requires large vehicle, but not weather dependent</li> </ul>	

Method	Results	Sources
TAT (thermal air technique)	<ul style="list-style-type: none"> <li>* Hot air with component of steam to avoid fire risk; not as useful in warmer climates like Auckland;</li> <li>* Used successfully in Wellington by Wellington Weedsprayers</li> </ul>	Wellington Weedsprayers, ph. (04) 9399333
Weed Ball	<ul style="list-style-type: none"> <li>* Good for localized application of herbicides to lawn weeds. Small and easy to lift to specific targets;</li> <li>* Treats strips only 36mm wide. Applies less herbicide as reservoir empties, tap adjusts flow;</li> <li>* Useful on paved/hard surfaces.</li> </ul>	Garden centres, farm supply stores
Weed Girl	Delivers 500mm wide band of herbicide, but flow needs adjusting with tap as reservoir empties. Good for “blanket” operations, edges, extensive weed patches	Garden centres, farm supply stores
Horticulture		
Beetle banks	A "beetle bank" is strip of slightly elevated land in the crop paddock, approximately 1m wide, planted in grasses that provide good cover of vegetation for insects to live in (e.g., cocksfoot, Yorkshire fog). Predatory beetles migrate at least 60 m into the paddock from the bank, so beetle banks are best at 100x150 m spacings	
Companion plants to attract beneficial insects	<p>Examples:</p> <ul style="list-style-type: none"> <li>* Hoverfly larvae eat aphids but adult hoverflies need a high intake of pollen and nectar for egg production. Phacelia flowers are an ideal source.</li> <li>* Buckwheat is suitable for many crops attacked by aphids and is cheap. Buckwheat fosters parasitic wasps. Strips of buckwheat flowers across the paddock offer better pest control than borders around the edge. Buckwheat flowers within about 5 weeks and can also be harvested as a gluten-free grain crop.</li> </ul>	<p>“Insecta wildflower mix” to attract beneficial insects available from Ecostore <a href="http://www.ecostore.co.nz">http://www.ecostore.co.nz</a> other specific seeds/plants available from garden centres etc.</p>
Cultivation regimes	Black nightshade and fathen plus others to a lesser degree declined with absence of cultivation. Need several years to control, if non-cultivation is only weed control method used.	
Mulch instead of pesticides	Trials on cauliflowers showed decreased plant damage and number of aphids.	
Trap crops	A few rows or metres of mustard around a corn crop, attracts green vegetable beetles, allowing corn crop to mature without attack from beetles. But the pest populations on the trap crops must be kept at a level that stops them leaving to look for more food (i.e. crop plants).	
Orchard		

<b>Method</b>	<b>Results</b>	<b>Sources</b>
Mulch as weed control	Use of organic and green mulch. Straw provided the most consistent weed control over 6 year trial	
Pastoral		
Genetic diversity	Introduction of “obscure breeds” to increase the genetic diversity of flock. Introduce a genetic line which has not been targeted by chemical companies and thus has not developed any inherited dependence on chemicals.	
Z-wiper (wipe-on applicators)	Reduces spray drift by direct contact of chemical on weeds. Set at height for weeds in pasture, e.g. rushes, thistles, etc	Farm supply stores
Urban weeds		
Fatty acids, infra-red and flame weeders	All showed brown-off after 7 days or less. Regrowth obvious 2-4 weeks later. Needs frequent re-application	

**Table 3: Methods for Specific Plant/Insect Pests**

Plant	Method/Product/Recipe	Sources
Aphids	* 2L water, 1 dessertspoon household bleach, 1 dessertspoon malt vinegar, ½ tsp. sugar, few drops dishwashing liquid, 100ml Biofeed™. Mix well, spray every 3-4 days, early morning or late evening. *Marigold spray: make marigold tea, soak overnight, then spray * Wormwood tea spray, make as marigold spray.	<a href="http://www.biofeed.co.nz">www.biofeed.co.nz</a>
Barley grass	Can be controlled by early grazing and encouraging competition from other species as well as lifting fertility.	
Black spot	Mix: 2L water, 1 tsp. cooking oil or 1 tsp neem oil, few drops of dishwashing liquid, 1 tsp baking soda, 100ml Biofeed™. Spray early morning or late evening every 3-4 days, until clear of spot	<a href="http://www.biofeed.co.nz">www.biofeed.co.nz</a>
Boneseed	Cut at ground level, turn stem upside down (cut end pointing to sky). As effective as herbicide but less costly.	
Buttercup	Stock will eat buttercup so grazing is one way of trying to exhaust the root reserves of the plant.	
Cabbages	Use of crop cover (exclusion net) rather than pesticides gave comparable yields to insects controlled by pesticides. Cover put on after an application of “natural pesticides”. Covers are expensive, but reduce pesticide costs while accelerating plant growth rates	
Californian thistle	* Defoliation (through grazing or mowing) regularly, inhibits photosynthetic opportunities. Takes approximately 3 years to be effective; * Populations can be reduced to very low levels by regular short term rotational grazing for 2 consecutive years, following either topping or spraying	
Carrot fly	Alternate carrot rows with onions; spread fresh coffee grounds between carrot rows.	
Cathedral Bells	Locate root system and dig out with garden fork, <b>OR</b> , cut vines at ground level (leaving vines up tree to die off), check annually for regrowth. Sets a lot of seeds, grows very quickly, so keep checking for regrowth	
Chickweed/ Redroot/ Storksbill/ Black Nightshade	These are common weeds on dairy farms. Control by ensuring high fertility. They come in when pastures open up and are grazed laxly by dairy cows. Avoid pugging in wet conditions and retain pasture covers in dry periods.	
Codling moth	Grow nasturtium or peppermint geranium around the base of apple trees, the smell helps deter the moth.	
Fleas & flies	Spray wormwood tea to kill & repel them.	

Plant	Method/Product/Recipe	Sources
Gorse	Gorse is a legume so fixes atmospheric nitrogen. Cutting mature plants is effective but the ground below the plant will yield masses of new seedlings once the old plant has gone. Don't burn the dead plant this encourages germination of new seeds. Ground must not be left bare - use some old hay as mulch. Graze any new seedlings with stock such as goats or grub them out. Liming will help to slow up growth.	
Green shield beetles	Populations usually peak in February. Have crops ready to harvest before then, or plant a later crop. Also try trap crops such as mustard or Cleome (spider flower).	
Mosquitoes	Spray wormwood tea to kill & repel them.	
Old Man's Beard	Root treatment: find where vines appear from ground. Either dig out rootball and connected roots, <b>OR</b> , cut roots underneath rootball and apply herbicide to cut ends immediately <b>OR</b> if access difficult, cut through rootball & apply herbicide	
Powdery mildew	Recipe: Mix 2L water, 1 tsp. cooking oil or 1 tsp neem oil, few drops of dishwashing liquid, 1 tsp baking soda, 100ml Biofeed <sup>TM</sup> . Spray early morning or late evening every 3-4 days, until clear of mildew	<a href="http://www.biofeed.co.nz">www.biofeed.co.nz</a>
Ragwort	The young plant is most toxic, although dead plants in hay can still be poisonous. Plants can be grubbed just before they flower to exhaust root reserves. Sheep will eat ragwort with no ill effects.	
Rushes	Continual cutting or hard grazing with mature stock will exhaust root reserves. Drainage and liming will help as they prefer wet acid areas.	
Slugs & snails	Mix bran, derris dust and molasses into paste. Put in plastic containers (lid on to keep birds out)with holes cut part way up sides. Slugs & snails will eat mash, swell up and die. *ALSO, use beer in bottom of bottles/containers (same methods with holes for their entry), these need emptying fairly frequently. * ALSO, wormwood infusion poured around plants repels slugs & snails.	
Wild ginger	Dig out all roots and rhizomes. Leaves may be composted. Rhizomes and roots can be turned into liquid fertilizer by decomposing in tub of water, or dispose at registered landfill. <b>OR</b> , expose all strings of rhizomes, bore out holes in 1 in 3 & fill with herbicide	
Woody weeds	Paint stump immediately after cutting with Escort 10 grams, Roundup 1 litre, Pulse surfactant 5 ml, Water 2 litres, Vegetable marker dye.	

**For successful weed control:**

- plan your weeding
- record what is done
- check how well it has worked
- do follow up work on time

From: <http://www.boprc.govt.nz/www/green/weedintr.htm#STUMP> (14.11.00)

## Appendix 3

### Contacts & websites:

**AgriQuality NZ:** PO Box 98905, South Auckland Mail Centre, Manukau  
Ph: (09) 262 7350, Fax: (09) 262 7370 [www.agriquality.co.nz](http://www.agriquality.co.nz)

**Auckland City Council:** Private Bag 92 516, Wellesley St, Auckland. Ph: (09) 379 2021  
[http://www.akcity.govt.nz/council/strategies\\_policies\\_plans/managing\\_resources/weed\\_management\\_policy](http://www.akcity.govt.nz/council/strategies_policies_plans/managing_resources/weed_management_policy) (Weed management strategy)

**Betta-Crop Organics:** 1338 Orini Rd, RD 2, Taupiri, ph (07) 824 4881, fax (07) 824 4620.  
(Organic Insecticides, Plantonic plant growth stimulant)

**BIO-GRO New Zealand:** Level 9, 75 Ghuznee St, Wellington. Ph. (04) 8019741  
[www.biogro.co.nz](http://www.biogro.co.nz)

**DeeWeed:** 110 Sinclair Rd, Ararimu, RD 3, Drury. phone 09 292 4143, fax 09 292 4153  
mobile (025) 918 055. [peter@deeweed.co.nz](mailto:peter@deeweed.co.nz) (organic mulch / weed mat)

**Ecostore:** PO Box 91718, Auckland Mail Centre. Ph. (09) 3608477 <http://www.ecostore.co.nz>

**Environment Bay of Plenty:** Ph. Toll Free: 0800 ENV BOP (368 267) Fax Toll Free: 0800  
ENV FAX (368 329) <http://envbop.govt.nz/www/green/weeds.htm> weed management/info

**Environment Canterbury:** 58 Kilmore Street; PO Box 345, Christchurch. Ph (03) 365 3828;  
fax (03) 365 3194. <http://www.ecan.govt.nz/echome/plans&reports/peststrat/peststrat.htm>  
(Pest management strategy)

**Environment Waikato:** 401 Grey Street, Box 4010, Hamilton East. Ph: (07) 856 7184; Fax:  
(07) 856 0551 <http://www.ew.govt.nz/ourenvironment/pests/plants/index.htm> plant pest info

**ENZA:** 11-17 Bolton St, PO Box 3328, Wellington. Ph: (04) 473 1420, Fax: (04) 472 2980  
e-mail: [info@enza.co.nz](mailto:info@enza.co.nz) , [www.enza.co.nz](http://www.enza.co.nz)

**Federated Farmers:** Agriculture House, Cnr Featherston & Johnston Streets. PO Box 715,  
Wellington. Tel (04) 473-7269. Fax (04) 473-1081. Email: [wellingtonoffice@fedfarm.org.nz](mailto:wellingtonoffice@fedfarm.org.nz)  
<http://www.fedfarm.org.nz>

**HORT RESEARCH NZ:** [www.hort.cri.nz/environment.htm](http://www.hort.cri.nz/environment.htm)

**Green Party:** PO Box 11-652, Wellington. Ph. (04) 8015102 [www.greens.org.nz](http://www.greens.org.nz)

[www.hortnet.co.nz](http://www.hortnet.co.nz) for general information from : NZ Fruitgrowers Federation ; NZ Plant  
Protection Society ; HB Focus Orchard ; NZ Society for Horticultural Science

**International Federation of Organic Agriculture Movements:** c/o Ökozentrum Imsbach,  
D-66636 Tholey-Theley, Germany. Ph: (+49) 6853-919890, Fax: (+49) 6853-919899  
<http://www.ifoam.org>

**Lifestyle block.co.nz:** PO Box 184, Cambridge. Ph: (07) 8277622, Fax: (07) 8277688  
[www.lifestyleblock.co.nz](http://www.lifestyleblock.co.nz)

**Lincoln Ventures:** Private Bag 3062, Hamilton. Ph.: (07) 858 4840, Fax: (07) 858 4841;  
PO Box 84, Lincoln University, Canterbury . Ph. (03) 325 3700, Fax: (03) 325 3725  
<http://www.lvl.co.nz/agrichemicals.htm>

**Natural Hub Organisation: UHIS PO Box 177 Helensville, North Auckland.**  
[www.naturalhub.com](http://www.naturalhub.com)  
[http://www.naturalhub.com/grow\\_food\\_helpful\\_products\\_and\\_people\\_nz.htm#food](http://www.naturalhub.com/grow_food_helpful_products_and_people_nz.htm#food)  
(Gardening aids & services)

**Naturally New Zealand Seaweeds:** PO Box 38234 Howick, Auckland. Freephone 0800-92-40-40  
[www.nzkelp.co.nz](http://www.nzkelp.co.nz) (Biotrina - Biogro certified seaweed nutrient spray)

**NZ Agrichemical Education Trust:** Ph. (04) 4729997

**NZ Fruitgrowers Federation:** Level 2 Huddart Parker Building, Post Office Square, PO Box 2175, Wellington. Ph (04) 472 6559 Fax (04) 472 6409 Email: [info@pims.co.nz](mailto:info@pims.co.nz)  
<http://www.fruitgrowers.org.nz/nzff/home.htm>

**NZ Growing Today:** PO Box 333, Kumeu. Ph. (09) 4207942; Fax (09) 4208937. E-mail:  
[editor@growing-today.co.nz](mailto:editor@growing-today.co.nz)

**NZ Organic Growers Exporters Group (OPEG):** PO Box 8640, Christchurch. Ph: (03) 348-0979; Fax: (03) 348-1867.  
[http://www.organicnewzealand.org.nz/links/new\\_zealand.htm](http://www.organicnewzealand.org.nz/links/new_zealand.htm)

**NZ Organics:** 46 Jervois Rd, Herne Bay, Auckland. Ph. (09) 3761330, Fax: (09) 3610082  
<http://www.nzorganics.co.nz>

**NZ Plant Protection Society:** [www.hortnet.co.nz/publications/nzpps](http://www.hortnet.co.nz/publications/nzpps) (online conference proceedings/papers)

**NZ Small Farmers Assn.:** PO Box 17 Inglewood, TARANAKI. Ph/Fax (06) 756 6265  
[www.smallfarmer.org.nz](http://www.smallfarmer.org.nz)

**NZ Wine & Grape Industry:** PO Box 90276 Auckland Mail Centre Street Address: Level 6, 47 Wakefield Street Auckland City Telephone: (09) 3033527 Fax: (09) 3022969  
[www.nzwine.com/](http://www.nzwine.com/)

**North Otago Sustainable Land Management Group:** C/- Waitaki District Council Private Bag, Oamaru. Phone: (03) 434 8060 Fax: (03) 434 1144 [www.noslam.co.nz](http://www.noslam.co.nz)

**Ocean Organics:** postal address: RD1 Ngatea; shop address: Main Road, Paeroa (opp the library)  
Ph: 07 862 8424 Fax: 07 862 8404; 0800 SEAWEED (0800 732 9333).  
[http://oceanorganics.co.nz/Seaweed\\_home\\_garden.htm](http://oceanorganics.co.nz/Seaweed_home_garden.htm)

**Organic directory:** [www.organicpathways.co.nz](http://www.organicpathways.co.nz)

**Organic Garden City Trust:** PO Box 327, Christchurch. Ph (03) 365 5038  
Fax (03) 379 2250. [OGCT@environment.org.nz](mailto:OGCT@environment.org.nz)

**Pipfruit growers:** Paul Brown (Product Group Manager) [pgnzi@xta.co.nz](mailto:pgnzi@xta.co.nz)  
P O Box 2175, Wellington. Ph: (04) 472 4730 Fax: (04) 494 9989

**Primus Gas Gardener:** Anthony's Outdoor Pursuits, 50 Vine Street, Whangarei. Ph: (09) 438 4512 or fax (09) 438 9276

**Soil & Health Assn.:** P O Box 36-170, Northcote, Auckland 9. Ph: (09) 360 0818  
fax: (09) 360 0818. [www.soil-health.org.nz](http://www.soil-health.org.nz)

**Sustainable Wellington:** P O Box 9608, Wellington. Contact: Mike Ennis, Home ph: (04) 387 1100, Work ph: (04) 471 2755. [www.sustainable.wellington.net.nz](http://www.sustainable.wellington.net.nz)

**Turf Prep:** P.O. Box 35-071, Christchurch. Ph: (03) 385 4073; email: [turfprep@xtra.co.nz](mailto:turfprep@xtra.co.nz)

**VegFed:** PO Box 10232, Wellington. Ph. (04) 472 3795 Grower Freephone: 0800 2 VEGFED (283433); Fax: (04) 471 2861. <http://www.vegfed.co.nz/about/default.cfm>

**Yates NZ:** 4 Henderson Place, Onehunga, Auckland 6. P.O. Box 1109, Auckland 1  
Ph: (09) 636 2800; fax: (09) 636 2802. [www.yates.co.nz](http://www.yates.co.nz) (for product information, e.g. Greenscape, Nature's Way brand)

**ZESPRI International:** Level 3, 9 Hopetoun Street; PO Box 9906, Auckland. Ph: (09) 3677500; Fax : (09) 3670220. <http://www.zespri.co.nz>