Hazardous Pesticides in South African Agriculture

KHANYISA EDUCATIONAL DEVELOPMENT TRUST
AND TRUST FOR COMMUNITY OUTREACH AND EDUCATION
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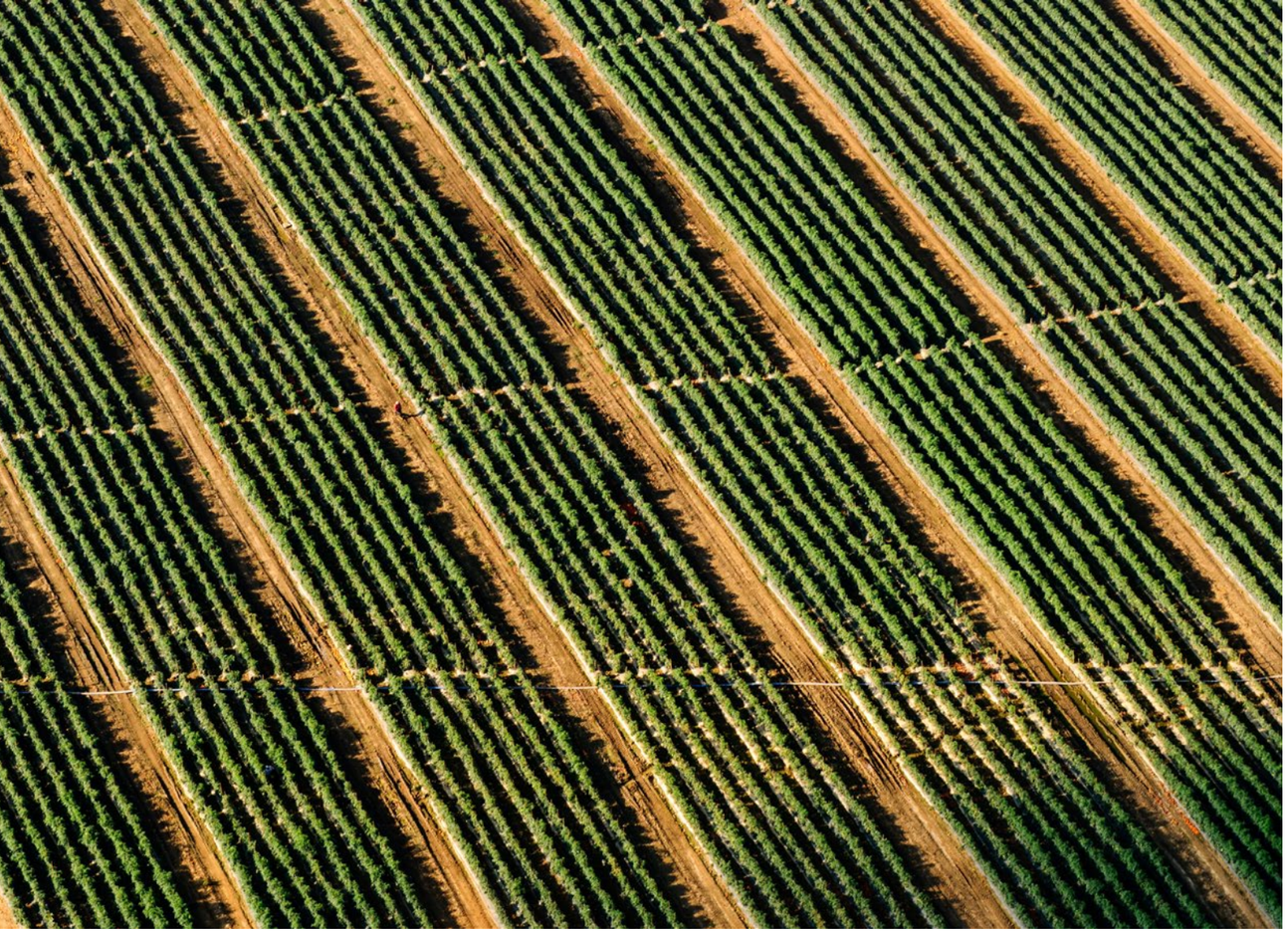


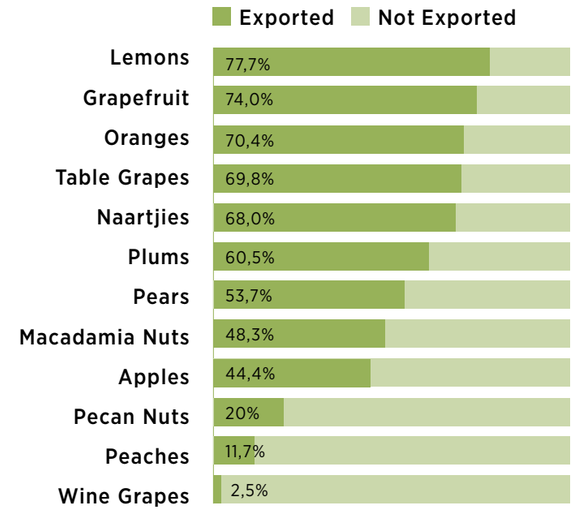
Introduction

Little is being done to protect the farmworkers who are routinely exposed to high levels of toxic pesticides where they work in South Africa. Workers are commonly suffering from chest and nasal problems, skin and eye irritations, headaches, nausea, and diarrhea which are symptoms that can be as a result of pesticide exposure. Farm workers are not provided with sanitizing facilities at the workplace to deal with pesticide residue on their bodies and clothing. It is commonplace that there are 'take home' exposures to farmworkers' families. Studies have proven the elevated risks of chronic diseases linked to pesticides, including cancer, birth defects and learning disabilities within farming communities. Migrant and female seasonal workers are particularly vulnerable to pesticide exposure within an hour of its application. South Africa faces an increasingly toxic future as it has registered about 500 active ingredients compared to just 293 in the European Union, who is its main fresh produce and wine trade partner. This research found 201 pesticide products with active ingredients that have mostly been banned in the European Union. Glyphosate, found in the popular weed killer Roundup, which the International Agency for Research on Cancer and the Cancer Association of South Africa found to be associated with cancer is widely used on citrus and wine grape producing farms which is the focus of this study. Despite the continued growth of the pesticide market, South Africa does not have an adequate pesticide monitoring program to evaluate levels of pesticide residue on foods. It also does not have systematic ways of assessing the health impact of pesticides on farm workers and the general population. A healthy and safe food system would serve the common interests of farmworkers, farming communities and consumers. Shifting away from reliance on hazardous pesticides — and toward agroecological farming — is a key step toward a pesticide free future.

Overview of Agriculture and Pesticides Use

South Africa is an agriculturally intensive country with 40 122 commercial farms employing 757 628 farm workers[1]. Primary agriculture contributes 2-3% of GDP. Together with the value chain, it is closer to 14%. Livestock and mixed farming amounts to 65% of all farms with field crops (21,3%) and horticulture (11,6%).[2] South Africa is not only self-sufficient in virtually all major agricultural products but is also a net food exporter. Despite the abundance of food South Africa has one of the highest malnutrition rates in the world. Today, fresh fruit accounts for approximately 50% of South African agricultural exports. Globally, South Africa is the second largest exporter of citrus fruit, with other fruit exports exported to 111 destination countries. Vegetables are also exported from South Africa. The largest importers of South Africa's fresh produce are the European Union, United Kingdom, Middle East and Far East and Asia. In addition, South Africa is the largest fresh fruit exporter (by volume) in the Southern Hemisphere.[3] South Africa is also the ninth-largest wine producer in the world, contributing 10,8% to the world's wine production in 2018.[4]

Although South Africa export worldwide, the EU is by far the wine industry's biggest export destination, accounting for 74,8 % while the African market constitutes 5,6 % of South Africa's total export sales volume.[5] The climatic conditions in South Africa range from Mediterranean, semi-tropic to semi-arid regions. These variations in climate allows for a wide variety of crops, from tropical fruit to maize and tree plantations. As each individual crop is susceptible to a unique host of pests, farmers use a unique mixture of pesticides to maximize production.[6]



Source: Stas SA, Agriculture Census 2017

Currently, South Africa has more than 9000 different herbicide, insecticide and fungicide products registered for use. This is a dramatic increase from the 3000 pesticide products registered in 2010.[7] As a comparative figure the South African pesticide or crop protection market grew close to 5% in 2018, in effect more than twice that of the global average.[8] Several studies conducted in South Africa have shown that current-use pesticides frequently enter water resources and affect both human health and the environment. More recently several pesticides have been identified as endocrine disruptors – these are chemicals that have the potential to interfere with the hormonal system of mammals, causing cancerous tumours, birth defects, abnormal growth patterns and other developmental disorders in children. The vast number of new pesticide products have increased rapidly over the years. The scientific evaluation of these chemicals is not able to keep up, so we have limited data on how toxic these new agents are, precisely because they are new. The registration system does not show they are safe, only to show there is no evidence (yet) that they cause harm. Because the pesticide products are new, that evidence takes time to emerge. The current efforts to limit or ban glyphosate would be a good example (see page 10).

The actual incidence and range of acute and chronic pesticide poisonings in South African are unknown. There is also no systematic collection of data and information relating to the occupational hazards for farm workers and the general population. South Africa has not instituted a fully functioning pesticide monitoring program; neither does it publish annual reports to profile pesticide residue levels on food. This information is essential to track national residue levels in exported, imported, and local food.[9] In other words, neither the Department of Agriculture, Forestry and Fisheries, the Department of Health, the Department of Labour or the National Institute for Occupational Health have a database where such information is stored. This is crucial as a lack of comprehensive information limits an accurate assessment of the impact of hazardous pesticides on the health of farm workers. It is a major stumbling block in the development of progressive policies and regulations on the use, deregistration and banning of pesticides.

Pesticides, is any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest. Though often misunderstood to refer only to insecticides, the term pesticide also applies to herbicides, fungicides, and various other substances used to control pests.

WHAT DO THE STUDIES SAY?

Studies that have investigated acute or chronic effects of agrichemical exposures have frequently concerned environmental settings or groups of workers involved in agrichemical production and have less commonly investigated farm workers.

Herbicides, also commonly known as weed killers, are substances used for killing or inhibiting the growth of unwanted plants, such as residential or agricultural weeds and invasive species.

A 1999 a study on the long-term respiratory health effects of the herbicide, paraquat, among 126 workers on 41 deciduous fruit farms in the Western Cape found that a significant relation existed between measures of long-term exposure to paraquat and Pulmonary fibrosis - a lung disease that occurs when lung tissue becomes damaged and scarred.[10]

Another study in 2003 linked birth abnormalities in the offspring of women engaged in subsistence farming in around East London in the Eastern Cape with pesticide use. The Cecilia Makiwane Hospital records indicated that the annual number of birth defects increased over the years. Most of the 267 mothers involved were unemployed and worked in their own gardens and fields to generate income for the household. Most of the women had used insecticides such as flumethrin for the dipping of cattle, goats and sheep as a control measure for ticks and only few reused plastic containers that had contained agricultural chemicals. The study found that exposure to cattle was significantly associated with the birth defects while goats and sheep were at a 5% level. Furthermore, women that used plastic containers to fetch water from a communal tap, a dam or river were found to be six times more likely to have childbirth defects than women who had taps in their own home.[11]

Source: trendingpackaging.com

In a 2007 survey in the Eastern Free State, found that whilst many farming operations use pesticides or poison, only 42 per cent of farm worker respondents said they received protective clothing. However, nearly one-third stated that the clothing was in poor repair, or that important pieces, such as gloves and face masks, were not issued. Nearly 40 per cent of workers used dangerous chemicals, but half of these said they received no training or unsatisfactory training.[12]

Source: tirogaverd.com

In 2008 a farmer in Riebeek Kasteel, one of South Africa's most successful wine areas lost a court case to the Schumacher family who claimed that spray drift from the farm had poisoned the entire family, causing respiratory collapse and pesticide induced arthritus. It was found that farmers regularly used Chlorpyrifos which was subsequently banned in 2010 for domestic use. [13]

A recent study in 2016 indicates that pesticide, metabolite levels in rural women in South Africa are higher than in the general population, confirming that exposure to these agents is related to extensive agrochemical use on farms. A total of 211 women of which 97 were female farm workers in the Western Cape rural areas were tested. The findings of this study suggest that several pesticides are consistently positively associated with some asthma-related outcomes.[14]

Several studies of pesticides detected in the Western Cape area's surface and ground water that includes drinking water, are chlorpyrifos, deltermethrin, and endosulfan. Endosulfan (an insecticide) was most often detected with levels exceeding the World Health Organisation (WHO) standards for health and safety. Endosulfan was most frequently detected in Grabouw (69%) followed by Hex River (46%) and Piketberg (39%). High levels of endosulfan metabolites have also been detected in farm workers and residents of the rural Western Cape.[15] In 2011 more than 120 countries agreed under the Stockholm Convention, an international treaty for controlling persistent organic pollutants to ban endosulfan, an environmentally persistent pesticide that can cause neurological and reproductive problems in people and wildlife.[16]

A more recent study (2019) into the watersheds of three major agricultural areas in the Western Cape, shows that the problems of high levels of toxic pesticides in water systems continues unabatedly. The different crops grown in the study areas allowed for comparison of crop-specific pesticide mixtures (Grabouw - pome fruits such as apples, pears, loquats etc., 81% of the area), Hex River Valley (table grapes, 98% of the area) and Piketberg (cereals, 56% of the area). Between July 2017 and January 2018, 96 different pesticide compounds 47 fungicides, 31 insecticides and 18 herbicides) were recorded to be sprayed over 38 farms. The average amounts of all applied pesticides over the seven months was highest in table grapes, followed by pome fruits, wine grapes, citrus and wheat. Herbicides are reported to be the most commonly used pesticides over all crops followed by fungicides and insecticides. Further, the insecticide imidacloprid (which is highly toxic for aquatic life) exceeded the environmental quality standards when assuming the highest sampling rate in all samples and up to 558-fold. Additionally, the highly toxic pesticides - thiacloprid, chlorpyrifos, acetamiprid and terbuthylazine were detected at least once 12, 9, 5 and 3-fold above the environmental quality standards, respectively.[7]

Fungicide is any toxic substance that destroys fungi or inhibits their growth.

EU banned thiacloprid in 2020 because according the Health Commissioner, Stella Kyriakides "there are environmental concerns related to the use of this pesticide, particularly its impact on groundwater, but also related to human health, in reproductive toxicity".[18]

An important case is the levels of detection of agricultural pesticides in river and tap water in the Letsitele, Limpopo province (where avocados, citrus fruit and mangoes are produced), Lomati, Mpumalanga province (primarily for sugarcane production) and Vals–Renoster, Free State (maize production along with sorghum and sunflower production) catchments, South Africa. The study found much higher concentrations of atrazine (a herbicide banned in the European Union) and other endocrine disruptors in drinking water. This presents a much higher potential of exposure to a myriad of effects on humans and the environment. A critical finding of this 2019 study is the detection of these pesticides in tap water (drinking water) of a primary school in the Lomati catchment.[19] However, the research did not investigate the actual health effects on these children, and this seems to be a limitation of these kinds of studies

Two of the largest estuaries in the Nelson Mandela Metropolitan Municipality — Swartkops estuary (SWE) and Sundays estuary (SDE), located in Port Elizabeth are important examples of surface water contamination in areas that are surrounded by agricultural activities and industries. The study found that the Swartkops estuary is more polluted compared to Sundays estuary, probably due to the influx of agricultural and industrial effluents. Pesticides find their way into the environment through run-off from agricultural areas, illegal waste disposal of chlorinated compounds and effluent discharge from industries. In this 2019 study, banned active ingredients such as endrin, dieldrin and endrin aldehyde[20] (chemicals used for killing pests, such as rodents, insects, or plants) were the most abundant in surface water samples from SDE and SWE. Carcinogenic (having the potential to cause cancer) and non-carcinogenic risk assessment revealed that the water from both estuaries is not safe for drinking, although suitable for bathing[21]. Endrin has not been produced or sold for general use in the United States since 1986[22] and banned in the European Union since 2004 [23]. The contamination of pesticides does not stop here but spread well into aquatic life. As pesticides bio-accumulate within fish and humans consume the contaminated fish they expose the body systems to these chemicals. The herbicides are atrazine, alachlor, simazine, metolachlor, and butachlor (banned in the EU and other countries) were found in the marine environment of Camps Bay, Cape Town.[24] In another study also in the Cape, Scientists from the University of the Western Cape have found that fish caught by small scale commercial fishers are contaminated by antibiotics, pain killers, antiretrovirals, disinfectants, and industrial chemicals. The sources of contamination in both cases were untreated or poorly treated sewage flowing into our ocean.[25]

Endocrine disruptors, sometimes also referred to as hormonally active agents, are chemicals that can interfere with endocrine systems. These disruptions can cause cancerous tumors, birth defects, and other developmental disorders

The hazardous effects of pesticides are also found in the food that we consume. A study in 2017 by University of Pretoria found unauthorized or banned chemical residue in fresh produce collected in the Tshwane and Johannesburg fresh produce markets. Pesticide residues detected on the various crops (carrots, pears, spinach and strawberries) are not officially permitted for use on these crops. Endosulfan which is banned in South Africa has estrogenic activity and can cause cancer, neurotoxic effects and damage to the adrenal glands. Another pesticide used in the agricultural industry is chlorpyrifos, which is associated with chronic illnesses such as obesity, diabetes and cardiovascular problems. The presence of pesticide residues is a major public health concern.[26] In the next section of the booklet we discuss how people and farm workers in particular become exposed to pesticide poisoning and the particular health hazards of pesticides.

The Health Risks Associated with Exposure to Pesticides

Scientific studies of the potential health effects of highly hazardous pesticides (HHPs), allow them to be classified as carcinogenic (can cause cancer), neurotoxic (can cause damage to the brain and nerves of the body), teratogenic (can cause damage to a fetus), immunogenic (affect the immune system), allergenic (results in different kind of allergic responses which could lead to diseases), nephrotoxic (damage the kidney) and hepatotoxic (damage to the liver). Pesticides can cause effects that are immediate (acute) or slow in the future (chronic) health effects.
Some people think that you can only be poisoned if you swallow something that contains toxic (poisonous) chemicals. This is not true. You can be affected if you smell (breathe in) toxic chemicals or if these toxic chemicals touch your skin and are absorbed by your body. They can also damage your eyes. Pesticides can enter the body in the following ways;

Through the skin (dermal)	This is most common in work situations where farm workers mix, load or apply pesticides. Skin exposure can also occur by touching an item or a person contaminated with pesticide residue.
Through the mouth (oral).	Large quantities of pesticides can result in the most harmful and serious poisonings. Pesticides can also be accidently ingested through accidental drinking or eating from a mislabeled or reused pesticides container.
Through the lungs (respiratory).	Absorption through the lungs occurs through airborne particles from powders or droplets. Inhalation is especially likely with high pressure, volume or fogging equipment.
Through the eyes (ocular).	Farm workers are also at high risk of exposure to pesticides and associated ocular toxicity. Exposure occurs when eyes are unprotected resulting in the absorption in ocular tissue and potential ocular toxicity

While pesticides are mainly used in agriculture, there are large quantities that are also used in many other places including our homes. Pesticides impact the health of everyone. In an average South African home (rural and urban) you will find many household products that have toxic (poisonous) pesticides that can make us sick. Household pesticides can be purchased from supermarkets or hardware stores and are designed for householders to use around their home or garden. The World Health Organisation says that most cancers are caused from coming in contact with toxic chemicals in our environments. Pesticides are chemicals designed to kill or harm pests and so if we use them around our homes, we are also exposed to them. A tragic case is the death of two children of the Ingram family in Port Elizabeth who died of organ failure after they inhaled the fumes of methyl bromide (banned in many countries), a highly toxic pesticide from a house that was being fumigated a few doors away[27]. Below are examples of where pesticides are found in and around the home.

SITE	EXAMPLES
Homes and gardens	Pest control in home vegetable, fruit and flower gardens and lawns. Collection of water using re-used pesticides containers.
Indoors	Insect control such as Doom, rodent control such as Ratex, mold and mildew control such as Mouldbusters, antibacterial multi-surface cleaners and flea powder and sprays.

Chemicals can trigger cancer in a variety of ways, including disrupting hormones, damaging DNA, inflaming tissues and turning genes on or off. Many pesticides are “known or probable” carcinogens and exposure to these chemicals is widespread. We’re experiencing a cancer epidemic, and evidence is growing ever stronger that pesticide exposure is a key contributor to this disturbing trend. Cancer causes the third largest number of deaths in South Africa after HIV/Aids, tuberculosis and malaria combined, with about 115,000 people diagnosed each year and 24 652 deaths in 2017. Studies show that pesticide exposure during pregnancy and throughout childhood increase the risk of cancer among children.

According to the Pesticide Action Network, North America, farmers, farmworkers and their families tend to be exposed to more pesticides than the general population. They also experience higher rates of a cancer. For example:

- Farmers and pesticide applicators have higher rates of prostate cancer.
- Women who work with pesticides suffer more often from ovarian cancer.
- Crop-duster pilots and farm women have higher rates of skin cancer.

WHY WE NEED TO BAN GLYPHOSATE

Glyphosate, which is used in a popular herbicide, Roundup is a weed killer is used in agriculture, fields and gardens. Bayer, following its 2018 acquisition of Monsanto, will pay up to $10.9 billion in the USA to settle nearly 100,000 individual lawsuits alleging that exposure to the glyphosate-based herbicide Roundup causes cancer.[28] A 2015 study by the International Agency for Research on Cancer (IARC) concluded that there was strong evidence that the weed killer’s main component, glyphosate, was “probably carcinogenic in humans”[29]. Glyphosate is the active ingredient in 79 agricultural products manufactured in South Africa mainly for agricultural purposes including Roundup, Roundup Max, Roundup RTU, Roundup Turbo Max and Roundup Weather Max (see annexure for detailed use by crop and use). Roundup garden products are also sold at popular retailers such as Builders warehouse, Makro, Pick ‘n Pay, Shoprite Checkers, Super Spars, Leading Garden Canter’s and Nurseries.

Source www.dekalb.co.za

According to Baum, Hedlund, Aristei & Goldman, a United States law firm representing hundreds of plaintiffs suing Monsanto for allegedly causing their cancer, the following countries have banned, intend to ban or imposed restrictions on glyphosate-based herbicides over health concerns and the ongoing Roundup cancer litigation[30]:

- **Austria:** The Austrian parliament passed a measure to ban glyphosate in July of 2019.
- **Argentina (2015):** More than 400 towns and cities in Argentina have passed measures restricting glyphosate use.
- **Australia:** Numerous municipalities throughout the country are currently testing alternative herbicides in an effort to curtail or eliminate glyphosate use.
- **Bahrain:** According to Oman’s Ministry of Agriculture, Bahrain and five other countries in the Gulf Cooperation Council (GCC) Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates have banned glyphosate.
- **Belgium:** Banned the individual use of glyphosate and the city of Brussels banned the use of glyphosate within its territory as part of its “zero pesticides” policy.
- **Bermuda:** Outlawed private and commercial sale of all glyphosate-based herbicides but allows restricted concentrations of glyphosate for managing roadside weed overgrowth.
- **Canada:** Eight out of the 10 provinces in Canada have some form of restriction on the use of glyphosate. Vancouver has banned public and private use of glyphosate, aside from the treatment of invasive weeds.
- **Colombia:** In 2015, Colombia outlawed the use of glyphosate to destroy illegal plantations of coca, the raw ingredient for cocaine, out of concern that glyphosate causes cancer.
- **Costa Rica:** In December of 2019, the country’s National System of Conservation Areas issued a guideline prohibiting the use of glyphosate in Costa Rica’s 11 Protected Wild Areas.
- **Czech Republic (2019):** The use of glyphosate has been banned on pre-harvest spraying of crops for human consumption.
- **Denmark:** In July of 2018, the Danish government implemented new rules banning the use of glyphosate on all post-emergent crops to avoid residues on foods.
- **Fiji:** The government announced in March of 2020 that glyphosate will be banned in the country effective January 2021.
- **France:** The country will eliminate the use of glyphosate by 2021 with limited exceptions. Some 20 mayors throughout the country have banned glyphosate in their municipalities.
- **Germany:** The government has agreed to ban the use of by 2023. Certain retail stores have already pulled glyphosate-based herbicides like Roundup from shelves.
- **India:** Between 2018 and 2019 two states in India, the state of Punjab and Kerala banned the sale, distribution and use of glyphosate.
- **Italy:** In 2016, the Italian government banned the use of glyphosate as a pre-harvest treatment and placed restrictions on glyphosate use in areas frequented by the public.
- **Luxembourg:** The country will become the first in the EU to completely ban all products containing glyphosate. On Dec. 31, 2020, the total ban on glyphosate will take effect.
- **Malta:** In July of 2019, Malta banned the use of glyphosate in public spaces.
- **Mexico:** In June of 2020, the government announced that the country will gradually reduce use of the herbicide until it is completely phased out by 2024.
- **Netherlands:** Banned all non-commercial use of glyphosate.
- **New Zealand:** The cities of Auckland and Christchurch passed resolutions to reduce the usage of chemicals for weed and pest control in public places.
- **Portugal:** Prohibits the use of glyphosate in all public spaces.
- **St. Vincent and the Grenadines:** The Caribbean country has placed an immediate suspension on the import of glyphosate-based herbicides.
- **Scotland:** Aberdeen cut back its use of herbicides and Edinburgh’s City Council voted to phase out glyphosate.
- **Spain:** Barcelona, Madrid, Zaragoza and the region of Extremuda have decided to ban glyphosate.
- **Sweden:** In 2017, the Swedish Chemicals Agency (SCA) announced it was planning to tighten rules on private use of plant protection products.
- **Switzerland:** Concerned about public well-being, the Swiss supermarket chains Migros and Coop removed glyphosate-based products from their shelves due to health risks.
- **Thailand:** A glyphosate ban was scheduled to take effect in December of 2019. However, after pressure from industry, the ban was reduced to a restriction.

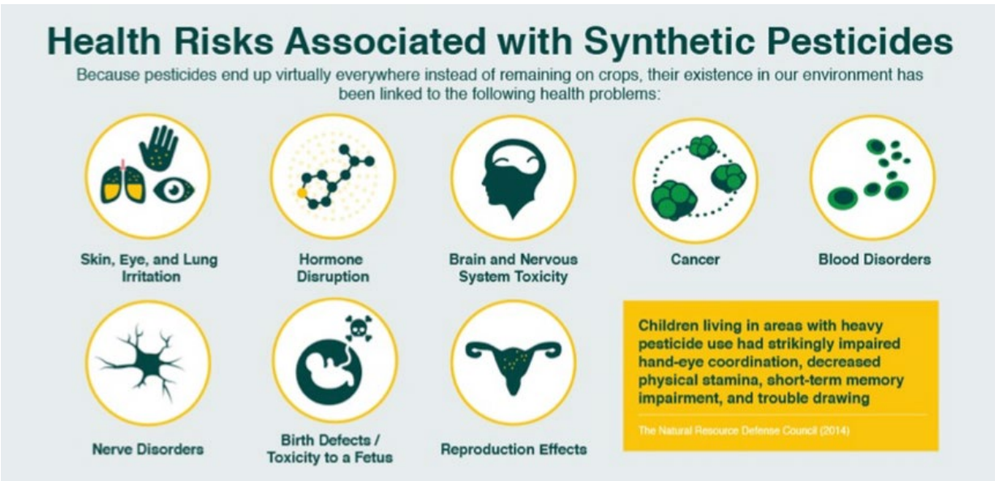
Groups such as African Centre for Biodiversity and livestock producer, Farmer Angus, has called on the South African government to ban the use of glyphosate. According to

the company, Farmer Angus, South Africa is the only country in the entire world where the population's staple diet, that being maize, is genetically modified. Maize crops including wheat, soya, cotton, vegetables, wine grapes, table grapes, fruit, nuts and sugarcane, are being sprayed with glyphosate[31]. The Department of Agriculture, Forestry and Fisheries refused to ban glyphosate and stated that[32];

All glyphosate-based products that are registered for use in South Africa have been through a robust chemical risk assessment process. Based on current risk assessments, glyphosate poses a minimal risk to users and the general public, provided it is used according to label instructions and safety statements.

The response of the Department of Agriculture, Forestry and Fisheries is a typical industry response to pesticide use and not one that considers public health concerns. When the International Agency for Research on Cancer (IARC) announced its findings on glyphosate in 2015 the pesticide industry represented by CropLife South Africa announced billions of losses if South Africa implemented a ban.[33] A few years ago endosulfan was considered a safe product to be used extensively in agriculture but it turned out to be very toxic. Rather than supporting International Agency for Research on Cancer (IARC) findings on glyphosate, the DAFF has made its decision based upon other agencies such as The Environmental Protection Agency (US EPA).

The Cancer Association of South Africa (CANSA) accepts the International Agency for Research on Cancer finding of a positive association between glyphosate exposure and cancer[34]. CANSA further accepts research results that indicate that glyphosate could be responsible (among others) for endocrine disruption, increasing risk of breast and other cancers. Furthermore, there is sufficient evidence in its view that glyphosate in formulation at low levels are found in the tissue of humans and animals.



CANSA ADVOCATES THAT:
The Department of Agriculture, Forestry and Fisheries should re-examine the conditions of approval of glyphosate in South Africa;

- The National Department of Health investigate the health implications of glyphosate exposure in South Africa with a view of instituting control measures over its free availability
- Glyphosate exposure to humans, animals and the environment must be limited as far as possible.
- The indiscriminate spraying of glyphosate on unwanted plants in rural areas must be discontinued as this indiscriminate spraying results in the destruction of cultivated fields of rural inhabitants which deprives them of self-sufficiency as far as food production is concerned
- No planting of edible crops should take place on soil sprayed with glyphosate until laboratory results indicate that the soil is totally free from any glyphosate residue

Maximum residue level - is the legal limit for pesticide residues in food for human consumption and animal feeds. Each foodstuff has its own limit.

While CANCER advocates a restricted use of glyphosate it has not questioned how the maximum residue levels (MRL) are set and by whom they are set. While local and international regulatory authorities set MRL values for pesticide residues in or on food products this is not set was Monsanto and a consortium of European chemical companies that performed the risk assessment for the re-approval of glyphosate which was used by the European Food Safety Authority (EFSA)[35]. The exclusion of the toxicity studies in rabbits and the exclusion of peer-reviewed studies introduced significant bias into the data used by the regulators to calculate an MRL that so that glyphosate poses a "minimal risk to users and the general public". There are different MRLs for glyphosate in the US, EU and South Africa. Why are local MRLs higher in food or on local products compared to exported products – which differ from country to country? The MRLs are unconvincing and scientifically suspect. Most recently, the Global Women's Health Federation FIGO made a call for phasing out of glyphosate herbicides to protect women and children's health. It based its decision on the recent meta-analysis published in 2019, which states that there is a compelling link between non-Hodgkins lymphoma (a cancer) and glyphosate[36].

FIGO invokes a Precautionary Principle:

When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.

In other words, it is the responsibility of industry to prove that its products are safe and not the responsibility of the public to prove that they are unsafe. This is the primary lesson that was learnt from the banning of endosulfan and other pesticides in the past. There is now enough global evidence on the dire consequence in the use of glyphosate-based herbicides on the health of humans and animals, water quality and the broader environment. The South African government has a duty to immediately invoke the precautionary principle to ensure that we play our part in stopping the cancer pandemic and environmental destruction.

The Use Of Hazardous Pesticides On Citrus and Grape Farms

In a recent study, by the Valencian (Spanish) farmers' association, warned that more than 50 active substances used in plant protection products that are banned in the European Union are being used in citrus fruit production in South Africa. These include: paraquat, a herbicide; azinphos-methyl, an insecticide; and carbendazim (banned since 2016), a fungicide[37]. This research found 201 products (herbicides, insecticides or fungicides) with active ingredients that are either banned or have a restricted use within the European Union (see, annexure b). The list of pesticides (active ingredients) banned for direct use in the European Union for agricultural, industrial, municipal or domestic purposes but used in South Africa are;

PESTICIDE (ACTIVE INGREDIENT)	EU APPROVAL STATUS	HEALTH & ENVIRONMENTAL RISK	SYMTOMS
azinphos-methyl (insecticide)	Not approved	Highly toxic to mammals. It is a neurotoxicant (alters the nervous system). It is highly toxic to birds, honeybees and most aquatic life. It is moderately toxic to earthworms.	Shown to trigger headache, seizures and loss of consciousness. Also causes muscle twitching, general weakness, tremor and reduced muscle coordination. Moreover, direct contact with the harmful compound is associated with the onset of severe skin irritation and serious eye conditions such as blurred vision and pinpoint pupils.
carbendazim (fungicide)	Not approved	Regarded as a reproduction and developmental toxicant. Carbendazim poisoning may adversely affect the liver, kidneys, and spleen. Highly toxic to earthworms, while moderately toxic to honeybees and most aquatic organisms.	The product may cause skin and eye irritation. May cause dizziness, nausea, salivation, laboured breathing and exhaustion when swallowed.
Chlorfenapyr (insecticide)	Not approved	High human oral toxicity. Highly toxic to birds, fish and aquatic invertebrates. Highly toxic to bees.	No specific symptoms of poisoning are known
Carbofuran (insecticide)	Not approved	Highly toxic to humans. May cause damage to organs through prolonged or repeated exposure. Death may result at high doses from respiratory system failure associated with carbofuran exposure. It is highly toxic to birds and honeybees whilst having a moderate to high toxicity to most aquatic organisms. It is moderately toxic to earthworms.	Blurred vision, Vomiting, Diarrhea, Breathing difficulty, Headache, Lassitude (weakness, exhaustion), Muscle twitching, Incoordination, Convulsions, Increased blood pressure, Incontinence, Abdominal cramps and Sweating
Chlorpyrifos (insecticide)	Not approved	Possible genotoxicity (which may lead to cancer) and developmental neurotoxicity (damage to central nervous system). Is detrimental to honeybees, arthropods, and earthworms.	Blurred vision, Vomiting, Diarrhea, Headache, Dizziness, Respiratory depression, Muscle twitching, Anxiety, Abdominal cramps and Sweating
Hydramethylnon (insecticide)	Not approved	Possible Human Carcinogen (causes cancer). Highly toxic to fish.	No specific symptoms of poisoning are known
Imazapyr (herbicide)	Not approved	Serious eye irritant. Long term harm to aquatic life and bees.	No specific symptoms of poisoning are known
Oxadiazon (herbicide)	Not approved	Likely to be carcinogenic to humans and toxic to bees	No specific symptoms of poisoning are known
Paraquat (herbicide)	Not approved	linked to reproductive effects and to Parkinson's disease.	irritation such as in the eyes, skin, and nose; Irritation, burning and distress in the mouth, throat, respiratory and gastrointestinal tract; Pulmonary fibrosis, nosebleeds, Dermatitis, Fingernail damage, Seizures, Shock, Shortness of breath, Vomiting (with or without blood), Heart, liver and kidney damage, death.
Propineb (fungicide)	Not approved	Harmful if inhaled or absorbed through the skin. Limited evidence of a carcinogenic effect. Toxic to fish and wildlife. Very toxic to certain aquatic organisms	Acute health effects of propineb include muscle weakness, flushing, breathing difficulties, nausea, vomiting, and low blood pressure. Moreover, exposure to high doses may lead to loss of appetite, squinting, excessive production of saliva, watery eyes, labored breathing, reduced body temperature, incoordination, depression, and rapid muscle twitching. If the chemical comes in contact with the eyes, it may result to tearing or redness in the eyes.
Pyroxasulfone (herbicide)	Not approved	Avoid contact, ingestion and inhalation. May cause sensitization in contact with skin. Toxic to aquatic organisms.	May cause eye or skin irritation
Saflufenacil (herbicide)	Not approved	Avoid contact, ingestion and inhalation. May cause sensitization in contact with skin. Toxic to aquatic organisms.	Irritating to eyes and skin
Thidiazuron (growth regulator)	Not approved	Suspected of causing cancer. May cause damage to organs through prolonged or repeated exposure. Very toxic to aquatic life with long lasting effects	Irritating to eyes and skin. May cause damage to eyes. May cause respiratory irritation.
Thiodicarb (insecticide)	Not approved	Toxic if swallowed, inhaled or absorbed through the skin. Toxic to fish, bees and wildlife.	Miosis, Lacrimation, Respiratory paralysis, Bradycardia, Hypotension, Salivation, Bronchial hypersecretion, Nausea, Vomiting, Diarrhoea, Sweating, Fibrillation, Muscle twitching, Myoclonus, Somnolence, Coma, Respiratory failure, Hypothermia, Convulsions.
Triadimenol (fungicide)	Not approved	Poisonous when swallowed, absorbed through the skin or inhaled. Toxic to fish and wild life.	Possible symptoms of human poisoning if product is swallowed are nausea, vomiting, stomach ache and diarrhea. If product comes into contact with the eyes, it can cause irritation leading to redness and tears.

HAZARDOUS PESTICIDES IN THE CITRUS INDUSTRY

Globally, South Africa is the second largest exporter of citrus fruit. The citrus industry contributed about R20bn in export revenue and the industry grew by 20% in 2019[38]. Citrus in South Africa is the second largest fruit crop after grapes in terms of production volumes. The Eastern Cape, being the powerhouse of the Southern African citrus industry, accounts for 27% of citrus production in the country. The citrus sub-sector in the province provides 19,700 jobs in the production and 10,000 jobs in the packing, processing, and marketing of the fruit[39]. The industry

is also an important foreign exchange earner and comprises of four broad categories, namely oranges, easy peelers (soft citrus), grapefruit, and lemons and limes. The Eastern Cape are considered 'cooler' citrus growing areas and production is focused on Navel oranges and lemons[40].

The first national fresh produce, Minimum Residue Level residue survey, conducted by the Department of Plant Science, Institute for Food Nutrition and Well-Being, at the University of Pretoria found that low exceedances of MRL values for exports were mostly associated with mangoes (3.13%) oranges (0.59%), avocados (2.38%), grapefruits (0.94%), and lemons (0.39%). The 6-year study (2009-2014) which tested 37,838 fruit and vegetable samples found a 98.95% compliance rate with 0.32% of the export samples being non-compliant. The report also found that the number of unregistered pesticide residues doubled over the last two years (1.18 and 2.50%) which is a cause for concern. Most citrus in the Eastern Cape is packed by privatized cooperatives in huge facilities that are amongst the largest in the world. The study found that cross-contamination can occur because of alternate crops packed in the same packing house[41]. Employers in the Sundays River estimate that around 41 000 workers may be employed at the height of the season. Women seasonal workers constitute a large section of the labour force in the orchards and pack-houses[42].

In 2018 over 1000 citrus farm workers went on strike and protested over low wages and poor working conditions. The Eastern Cape farming community around Kirkwood, in the Sundays River Valley were greatly affected. Production came to a complete standstill. The harsh working In 2018 over 1000 citrus farm workers went on strike and protested over low wages and poor working conditions. The Eastern Cape farming community around Kirkwood, in the Sundays River Valley were greatly affected. Production came to a complete standstill. The harsh working conditions of precarious farm workers[43] make them vulnerable to pesticide exposure. Chairperson of the Sundays River Workers Forum and Sanco, Vuyisile Sikani, told The Citizen newspaper that workers are being majorly exploited[44];

In 2019 Zoliswa Ntlanjeni, who works on a farm in the Sundays River, told the meeting organised by trade unions with the department of labour that[45], While we don't have a clear picture of the extent of pesticide poisonings the lack of protective clothing especially for migrant and seasonal workers are an indication of huge health problems on citrus farms. For example, on the EU certified export farms of Nuwelande, Hillside and Panzi only permanent workers are issued with protective clothing. On the Nuwelande farm for example workers indicated that the spraying of pesticides take place in close proximity of migrant workers. Workers have complained about headaches, itchy throats, faces, and arms while one worker at Hillside citrus farm had acute lung poisoning[46].

Most workers in the citrus farms and factories are earning R16 an hour. That amount is too little given the type of job they do. Workers are not even provided with protective clothing. They do not have work suits, raincoats, gloves and other protective clothing. Yet their work exposes them to hazardous chemicals and poisonous snakes.

The husband of my friend, Buyiswa Mbetha, died in December of 2007 after his shoulder was severed by a machine while he was spraying pesticides. Buyiswa hasn't got any compensation for that. To make matters worse, she was evicted by the farmer from the house she was staying with her late husband.

Our research on pesticides indicate that farms within the Sundays River Valley and Kouga Municipality in the Eastern Cape use pesticide active ingredients which are either banned or highly restricted in the European Union. All the farms (below) use their own specific combination of highly toxic pesticides (herbicides, insecticides and fungicides) in citrus production.

FARM	NAME OF PESTICIDE	COMPANY	TYPE OF PESTICIDE	ACTIVE INGREDIENT
Hillside	SCAT 360 SL	Villa	Herbicide	Glyphosate
Quacha	SCAT 360 SL	Villa	Herbicide	Glyphosate
Sunriver	SCAT 360 SL	Villa	Herbicide	Glyphosate
Oranjelus	Roundup Turbo	Monsanto	Herbicide	Glyphosate
Sunriver	Gramoxone	Syngenta	Herbicide	Paraquat
Quacha	Pyrinex 480 EC	Adama SA	Insecticide	Chlorpyrifos
Sunriver	Pyrinex 480 EC	Adama SA	Insecticide	Chlorpyrifos
Nomzamo	Chlorpyrifos	ArystaLifeScience	Insecticide	Chlorpyrifos
Oranjelus	Chlorpyrifos	ArystaLifeScience	Insecticide	Chlorpyrifos
Quacha	Chlorpyrifos	ArystaLifeScience	Insecticide	Chlorpyrifos
Sunriver	Chlorpyrifos	ArystaLifeScience	Insecticide	Chlorpyrifos
Quacha	Siege	BASF	Insecticide	Hydramethylnon
Hillside	Hunter	BASF	Insecticide	Chlorfenapyr (pyrrole)
Quacha	Hunter	BASF	Insecticide	Chlorfenapyr (pyrrole)
Sunriver	Hunter	BASF	Insecticide	Chlorfenapyr (pyrrole)
Hillside	Dithane M-45	Southern-Ag	Fungicide	Mancozeb
Oranjelus	Dithane M-45	Southern-Ag	Fungicide	Mancozeb
Quacha	Dithane M-45	Southern-Ag	Fungicide	Mancozeb
Sunriver	Dithane M-45	Southern-Ag	Fungicide	Mancozeb

Glyphosate, the herbicide which has either been banned, being phased out or whose use is highly restricted globally is found in 79 products produced and sold in South Africa. The other highly toxic herbicide, paraquat is found in 25 products produced and sold in South Africa. Paraquat is now banned in over 40 countries, including in the European Union and Switzerland because of its adverse health effects. Even in the European Union, where personal protective equipment (PPE) is widely available and used, paraquat was considered too dangerous for users and therefore banned. Paraquat was recently banned in Serbia, South Korea, Togo and Zimbabwe. Paraquat is highly toxic and is 28 times more acutely toxic than glyphosate. Acute poisoning may occur through contact with skin, eyes, or via inhalation. There is now evidence that chronic exposure to paraquat is linked to adverse effects, on the respiratory system, causes reproductive problems, and increased risk for Parkinson's disease[47]. On the Sunriver farm, farm workers are exposed to this toxic substance which is used throughout the year, during handling and mixing, spraying and working in recently sprayed fields.

As the UN's Food & Agriculture Organisation has demonstrated, training in proper pesticide use is not a solution for risks associated with the use of highly hazardous products. Users in developing countries often do not have access to the required Personal Protective Equipment (PPE). Moreover, expecting users to wear full protective clothing in warm and humid climates is unrealistic[48]. Also, the insecticides banned in the EU, chlorpyrifos (19 products), chlorfenapyr (5 products) and hydramethylnon (11 products) are used on the citrus farms in the Sundays and Kouga municipal area.

Chlorpyrifos has been used by farmers to kill insect pests on a wide variety of crops including cabbage, broccoli, wine grapes and citrus. It is also a popular compound used to control and eliminate fleas, insects, termites, pests and mosquitoes. It's a popular ingredient in dog shampoos, dog flea collars and flea sprays[49]. In South Africa, the use of Chlorpyrifos was banned in 2010 for residential use but it is, however, still allowed to be used for pest control in the agricultural sector[50]. The compound is associated with health problems, such as neurological impacts (brain damage) in children and respiratory problems. In February this year, the world's largest chlorpyrifos manufacturer, Corteva, the corporation formed from a Dow Chemical and DuPont merger, agreed that it will stop producing the chemical in the USA[51]. The company cited declining sales of the chemical for halting its production. In 2018, Hawaii became the first state of the USA to ban pesticides containing chlorpyrifos; its prohibition will take effect in 2022. New York lawmakers also approved legislation to ban the pesticide by late 2021. California also banned chlorpyrifos. In California's Central Valley, researchers raised concerns about the impacts of chlorpyrifos on pregnant women who lived near farms. The direct pesticide poisonings from spray drifts and the long-term health challenges are linked to chronic exposure. They described children vomiting, suffering painful skin irritations, debilitating headaches and dizziness, as well as developing autism, learning problems, attention deficit disorders and respiratory ailments[52].

Chlorfenapyr has not been studied extensively, but its toxicity to humans is very high. In case of inhalation, skin and eye contact, chlorfenapyr may cause mild irritation, tearing, nausea, and headache, irritation to mucous membranes and respiratory tract and breathing difficulties[53]. The persistence hazard for chlorfenapyr in any environment is considered high because it is likely to take over a year for it to degrade to half of the application concentration. Chlorfenapyr is moderately toxic to worms and highly toxic to birds, bees, fish and other aquatic organisms[54]. More than 75% of our main food crops rely on nature's pollination services, which means that they significantly boost food security and increase farmers' profitability[55]. Bee mortality as a result of exposure to pesticides is relatively common in South Africa. As recent as 2018 millions of nature's chief pollinators were wiped out in Cape Town's wine farms due to incorrect use of pesticides[56].

Hydramethylnon products are popular for ant and roach control and are classified as a possible carcinogen (causes cancer) and is toxic to aquatic organisms and causes long-term adverse effects in the aquatic environment. Data is not available from accidental poisonings, occupational exposures, or epidemiological studies regarding the toxicity of hydramethylnon in humans[57].

Mancozeb is a fungicide that has been associated with different possible health effects by many scientists. This fungicide is used in the cultivation of more than 70 fruit and vegetable crops. Many studies carried out that don't depend on the agrochemical industry, have linked this pesticide to different health risks. The prestigious Collegium Ramazzini in Bologna associated this substance with eight different types of cancer. Other research has associated it with thyroid problems or neurotoxicity (such as Parkinson's)[58]. This year, the European Food Safety Authority (EFSA) concluded that mancozeb did not meet the approval criteria due to reproductive toxicity and endocrine disruption[59].
In May this year India's government moved to ban 27 pesticides, including key products like mancozeb, 2,4-D, and chlorpyrifos. This is despite the country being the largest manufacturer of mancozeb and choloropyrifos for both the domestic and international markets[60].

HAZARDOUS PESTICIDES IN THE WINE INDUSTRY

Between 1996 and 2013 South African exports of fresh produce more than doubled in real terms, while wine exports increased more than 500%. The wine industry supports employment opportunities to the tune of 289 151 workers in the RSA[61]. Despite the increases in exports and profits of the agricultural industry, the working and living conditions of farm workers became more precarious. The trend was one of shifts away from permanent employment on farms to the employment of seasonal and casual labour in neigbouring informal settlements. Women are more likely to be employed on a seasonal and casual basis than men and at lower pay[62].
A recent study commissioned by Women on Farms, an NGO into labour rights of female farm workers in the Western Cape (De Doons, Paarl, Rawsonville, Stellenbosch, Wellington and Wolseley) and Northern Cape (Augrabies, Kakamas, Keimoes and Upington) found that 40% of the workers had no employment contract and 41% of workers are paid below the minimum wage rate.

Farmworkers are constantly exposed to pesticides in multiple ways: when working to apply them, working in the same field while pesticides are sprayed, working in adjacent fields and being exposed to pesticide drift, or through residue on crops. The basic precautions on pesticide product labels often state;

Do not smoke, eat or drink whilst handling this product or before washing hands and face and changing clothes.

Prevent contamination of food, feed, drinking water as well as eating utensils.
Avoid skin, eye or clothing contact with the concentrate or spray mixture.

Wear protective clothing (impermeable gloves, and eye / face protection) while handling this product.

Wash with soap and water directly after use and after skin contact.
Thoroughly wash protective equipment and contaminated clothing after use.

Of the 343 female farm workers in the Women on Farms study, 63% had no access to a toilet and 50% had no access to washing facilities in vineyards. Not only is the dignity of the women compromised but there is also a lack of access to safe drinking water and an inability to wash hands for basic hygienic purposes. While most of the women (67%) are exposed to pesticides at work; only 27% were informed by the farmer what pesticides are being used and its side effects and 65% did not receive protective clothing while at work. As many as 48% of women on export producing farms did not receive protective clothing. The lack of adequate washing facilities means that the women exposed to hazardous pesticides. It also exposed their families to it as they had to clean themselves and their clothes at home. Exposure to pesticides appear to be an old gendered problem as women do not work with pesticides.

The tractor sprays pesticides when people are in the field. So, the spray touches you and your skin. If your skin is exposed, then [you] get a rash. The wind will carry pesticides to people…. The tractor driver gets mask, but not people in the field…. It's not fair to spray … when [the] wind [is] blowing [on] all other peoples.
—Duduza C., De Doorns, November 28, 2010.

[T]hey must test if there are pesticides in your blood. If there are, then they can't make you work with pesticides. Only the white supervisor and the men went to the doctor to be tested, but never the women. Before I left, a white supervisor was diagnosed to have pesticides in his blood, so he did other jobs. Women asked to be taken to the doctor, but the farmer said that only the men had to go. But the women spent as much time with the pesticides as the men.
— Greta P., Stellenbosch, December 10, 2010

Source: Human Rights Watch. Ripe with Abuse: Human Rights in South Africa's Fruit and Wine Industries. 2011.

Farm women in the Western Cape (75%), were particularly vulnerable to pesticide exposure within an hour of their application with permanent female workers at higher rates (65%) than seasonal workers and more so if they worked on export industry farms where there is a 56% exposure rate. Furthermore, the most known common side-effects for women on farms are skin irritations, nasal and eye problems, breathing difficulties, headaches and nausea[63].

The South African wine industry has refuted allegations that wine grape producers in the country are using illegal pesticides that are harmful to farm workers. The industry has claimed that all of the products that is used are registered by the Department of Agriculture and the Integrated Production of Wine Scheme (IPW) prohibits the use of any unregistered products, in accordance with South African legislation. This research has found that at least 87 pesticide products (herbicides, insecticides and fungicides) that are used in the wine industry have pesticides (active ingredients) that are banned for use in agriculture and food production within the European Union but are legally produced and sold to and used by agricultural producers in South Africa (see annexure b). Highly hazardous products used by the wine industry contain the active ingredients; chlorfenapyr, chlorpyrifos, glyphosate, paraquat (already discussed under citrus farming), oxadiazon and triadimenol.

Oxadiazon, an herbicide is not approved for use in the European Union and is likely to be carcinogenic (cancer causing) and is toxic to bees.

Triadimenol a fungicide may harm fertility or unborn children, may harm breast-fed children, and is toxic for aquatic organisms.

The active ingredient, usually the only component of the formulation listed on the pesticide label, is by nature biologically and chemically active against a target pest, be it an insect, weed or fungus. By definition these chemicals kill living things.

The European Union has banned pesticides for use in its own agricultural production because of the health hazard posed to humans, animals, insects, aquatic life and water systems. Before an active substance can be used within agriculture in the EU, it must be approved by the European Commission. The Commission evaluates every ative substance for safety before it reaches the market in a product. Accordingly, substances must be proven safe for people's health, including their residues in food and effects on animal health and the environment. It takes 2.5 to 3.5 years from the date of admissibility of the application to the publication of a Regulation approving a new active substance[64]. The EU however, practices double standards. The EU bans the use of hundreds of pesticides for use in European agriculture but at the same time allows European chemical companies to produce hazardous active ingredients for sale on the world market, especially in developing countries who make up the lion share of the world market in pesticides. Furthermore, the EU allows countries outside of its boundaries including South Africa to produce fresh produce which the EU imports as long as the product, pesticide 'maximum residue level' is in line with its own health requirements. In this way the EU exports and dumps the direct hazardous health and environmental impact of pesticides onto developing countries. On the other hand, banned substances in the EU find the way back to the EU via the export of fresh produce and wine from South Africa.

The scientific evidence as well as the experiences of farm workers provided in this report show that the regulations on pesticides are far from adequate in protecting human life and the environment. The next section will unpack how the pesticide regulations in South Africa are largely in support of the export agri-business sector in South Africa.

Understanding the Regulations Regarding the Use of Pesticides

There are about fourteen regulations containing pesticides in South Africa. Of these important ones are;

- Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947).
- Foodstuffs, Cosmetics and Disinfectants Act (Act 54 of 1972)
- Agricultural Products Standards Act, 1990 (Act 119 of 1990)
- Hazardous Substances Act, 1973 (Act 15 of 1973)
- Occupational Health and Safety Act, 1993 (No.85 of 1993)

Legislation	Registration/ Approval of Products	Enforcement of Legislation
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947).	Department of Agriculture, Forestry and Fisheries (DAFF) • Provides the institutions for the registration permits and usage of pesticides. • Ensuring that South African producers and exporters comply and that only chemical remedies registered in terms of the act are used.	Department of Agriculture, Forestry and Fisheries (DAFF) • Conducts inspections and oversees compliance.
Agricultural Products Standards Act, 1990 (Act 119 of 1990)	DAFF • Classification of products according to the standardised system.	DAFF • Enforcement includes testing samples for levels of pesticides
Foodstuffs, Cosmetics and Disinfectants Act (Act 54 of 1972)	Department of Health Regulations for maximum limits for pesticide residues.	Department of Health May prohibit the sale, manufacture or importation of certain pesticides.
Hazardous Substances Act, 1973 (Act 15 of 1973);	Department of Health The Act sets requirements on the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of hazardous substances.	Department of Health Conducts inspections and oversees compliance.
Occupational Health and Safety Act No.85 of 1993	Department of Labour This regulation stipulates the Occupational Health and Safety standards for employers and users working with and around hazardous chemical substances	Department of Labour Conducts inspections and oversees compliance.

The Department of Agriculture, Forestry and Fisheries (DAFF) regulates the manufacture, distribution, sales, use and advertisement of pesticides. It derives this mandate from the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act. Pesticides have been regulated in South Africa for the past 73 years by the Department and to date this covers about 9000 pesticide products.

In accordance with the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies and the Agricultural Products Standards Act, the DAFF develops policy[65] for the registration of new or renewal of active ingredients in line with guidelines set by United Nations bodies such as the Food and Agriculture Organisation (FAO) and the World Health Organisation (WHO). If the active substance is already registered by the registration authorities of the USA, EU, UK, Japan or Australia, and accompanied by a report by an independent and accredited toxicologist, a provisional registration is granted by the registrar. Should an applicant wish to apply for an extended shelf life for a product, this must be done according to the DAFF policy, as well as the Croplife, 2009 Technical Monograph No 17: "Guidelines for specifying the shelf life of Plant Protection Products". CropLife International is an influential trade association and lobby group for the world's major agrochemical and agricultural biotech companies.

The 'maximum residue level' (MRL) is determined by DAFF who conducts evidence-based scientific evaluation and approval of the pesticides. DAFF uses the World Health Organisation Codex on Pesticide Residue as a guide but sets its own levels which can be higher or lower than the recommended Codex level. The DAFF recommended MRLs for the various pesticides is then sent to the Department of Health which determines the level of the health hazard posed. The MRLs considered feasible and approved for use in South Africa is published by the Department of Health under the Foodstuffs, Cosmetics and Disinfectants Act. The most recent list of approved MRLs has been published, on 10 February 2020[66].

Local and international regulatory authorities set MRL values for pesticide residues in or on food products, which are considered 'safe' and which are not supposed to pose any health risks. Of importance is that MRLs for local production of fresh produce and wine may be set at a different level, including exports to different countries requiring different MRLs. MRL data therefore plays a critical role in the fresh produce and wine industry for the local and export destinations to ensure market access. If a pesticide residue exceeds the MRL, the fresh produce commodity will be withdrawn (if there is adequate monitoring and enforcement) from the local and international market. Food produced in non-EU countries that contains residues of a substance not approved for use in the EU may still be imported into the EU, if it complies with the MRLs established in the

EU. However, if such food does not comply with the MRLs, it cannot be placed on the EU market.

The European Food Safety Authority annually prepares a comprehensive report about the level of pesticide residues in fruit and vegetables submitted by each member state. The Perishable Product Export Control Board (PPECB) is an assignee of the DAFF in South Africa, responsible for quality inspection of fresh produce destined for export, cold chain management, and sampling for pesticide residue analysis. After Spain, South Africa has the most GLOBALGAP-certified (good agricultural practices) fruit producers in the world. The EU reported 98% compliance for all imported produce from South Africa's export industry[67]. The regulatory framework follows South African international agreements[68].

International obligation and agreements:
Rotterdam Convention on the Prior Informed Consent Procedure (PIC) for Certain Hazardous Chemicals and Pesticide in international trade;
Montreal Protocol on Substances that Deplete the Ozone Layer;
Stockholm Convention on Persistent Organic Pollutants (POPs); and
Globally Harmonised System (GHS) of Classification and Labelling of Chemicals

However, South Africa does not have a pesticide monitoring program for both local and international fresh produce and wine. At the moment South Africa's laboratories in Pretoria and Stellenbosch services to check compliance with MRLs are dedicated exclusively to the export industry. This information is essential to track and formulate an understanding of the national situation in relation to compliance with residue levels in exported, imported, and local food commodities.

The Croplife, Agri-Intel database[69] is currently available for users within the agrochemical industry to access registered crop protection product information. DAFF has effectively outsourced the database on pesticides that contains crop information, safety data sheets (SDS) and information on maximum residue limits (MRL) to Croplife South Africa. It is a huge concern that South Africa is highly dependent on the private sector to monitor and self-regulate in terms of pesticide use. It is an abrogation of the state's obligation to ensure access to information and to manage the regulation of pesticides.

The Occupational Health and Safety Act instructs employers 'to eliminate or mitigate and hazard or potential hazard to the safety or health of employees'. Employers are expected to;

- Not permit any employee to work or handle hazardous material unless precautionary measures have been put in place
- Ensure that information is available with regards to the substances used at work, the health effects of the substances and proper procedures are established in the event of an accident.

The Hazardous Substances regulations also in turn makes it compulsory for an employer to provide an employee who is exposed to hazardous chemicals and pesticides with the appropriate protective clothing. In the Women on farms study (2019) the report states that while three quarters of farm workers are exposed the pesticides only 27% were informed about the health hazards posed and 66% of workers indicated that they did not receive protective clothing.

Moreover, the Department of Labour does not have a sufficient number in inspectors to visit workplaces and farms in South Africa. For example, in 2010 there were only 107 inspectors for all workplaces, including 6000 farms in the Western Cape. The majority of South African workers, especially farm workers whose working conditions are generally more precarious have a very slim chance of any complaints being investigated by the labour inspectors

The Value Chain Of Pesticides Production

Croplife (an association of agrichemical producers) members Syngenta, Bayer Crop Science, BASF, Corteva Agriscience, and FMC are the five biggest pesticide companies in the world by agrochemical turnover. CropLife's sixth member is the Japanese company Sumitomo Chemical, the world's 8th biggest pesticide company. More than 9000 pesticides products are authorized in South Africa. Most of the pesticides imported into South African come from China, USA, Germany and Belgium. South Africa is at the same time a major exporter of pesticides to the African region. South Africa's share of the African agrochemical market is currently around 35%. Major players in the pesticide industry in South Africa are;

- *Aeci Ltd*
- *Arysta Lifescience South Africa (Pty) Ltd*
- *Ascendis Health Ltd*
- *Basf Agricultural Specialities (Pty) Ltd*
- *Basf South Africa (Pty) Ltd*
- *Bayer (Pty) Ltd*
- *Dow Agrosciences Southern Africa (Pty) Ltd*
- *Farm-Ag International (Pty) Ltd*
- *Intelichem (Pty) Ltd*
- *Kombat (Pty) Ltd*
- *Monsanto South Africa (Pty) Ltd*
- *Oro Agri Sa (Pty) Ltd*
- *Plant Health Products (Pty) Ltd*
- *River Bioscience (Pty) Ltd*
- *Scientific Chemicals (Pty) Ltd*
- *Syngenta South Africa (Pty) Ltd*
- *Villa Crop Protection (Pty) Ltd*

The agrochemical industry plays a central role in agricultural production which is at the beginning of the value chain Pesticides amongst others such as seeds and fertilizers are part of the inputs at the beginning of the farming process. Large pesticides distribution companies are involved in both the import and export of pesticides which are then bought by farmers[70]. The farmers have treated the agricultural produce with pesticides before, during and after production with the finished product then distributed to food processing companies and major retailers both locally and internationally[71].

The agrochemical industry is integral to the entire production process in commercial agriculture in South Africa. Each step of the production process is tightly controlled by integrating the purchase of seeds, pesticides and fertilizers by major companies like Monsanto. For example, farmers cannot replant seeds which have been genetically engineered after a harvest due to intellectual property rights and can be taken to court if they contravene their agreement with the companies. In many ways a country and indeed farmers can lose their food sovereignty in this manner.

Towards A Pesticide Free Future

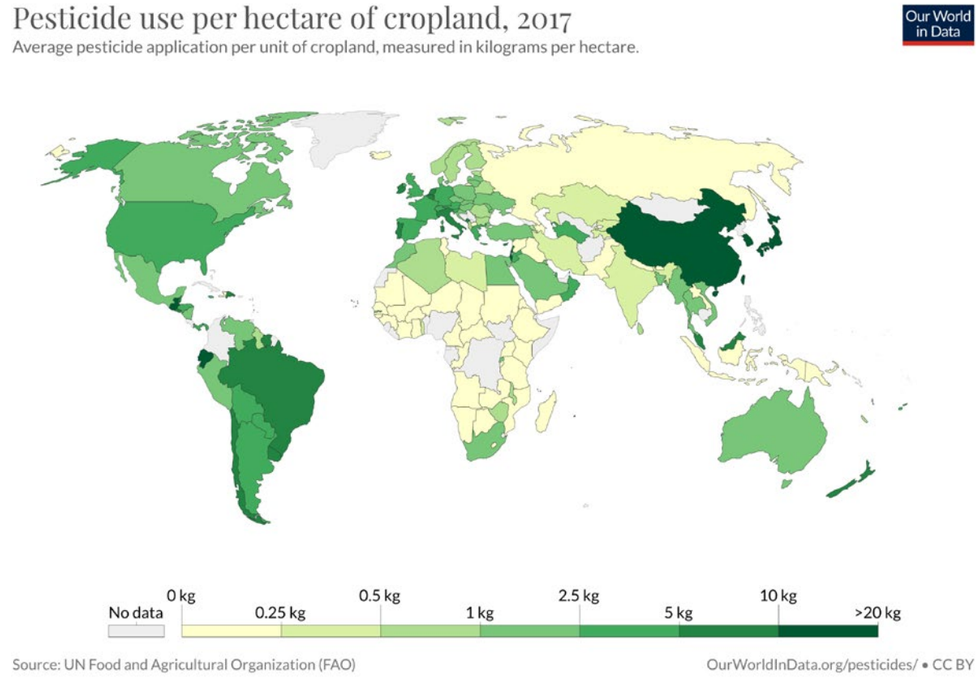
The critique of the industrial agriculturalist idea that pesticides are essential to feed a fast-growing global population was developed by Rachel Carson, an American in the early 1960s[72]. According to the UN's special rapporteur on the right to food Hilal Elver, the industrial agriculture argument: "is a myth… and … using more pesticides is nothing to do with getting rid of hunger". According to the UN Food and Agriculture Organisation (FAO), "we are able to feed 9 billion people today. Production is definitely increasing, but the problem is poverty, inequality and distribution." In other words, the industrial model of agriculture is able to produce sufficient food to feed the global population, but its essential function is production for profit and not the satisfaction of basic needs of people. Thus, while it is true that the widespread use of pesticides has yielded mass production of a global scale, millions of people at the same time cannot afford to buy nutritious food.

Rachel Carson argued that the use of pesticides was not the application of a rational science but rather served the narrow interests of the agrochemical industry. Her prediction of a pesticide treadmill - a situation where pesticides would create a reaction in organisms that allowed them to evolve rapidly and become more resistant to pesticides would in turn trigger higher doses required and a rapid development of new active ingredients for pesticides has materialized. In 1960 the pesticide industry was worth less than $10 billion and there were around 100 active ingredients available to farmers. Today, the industry is valued at over $50bn and there are around 600 active ingredients available to farmers globally[73]. This amounts in a 500% increase in the number of active substances since 1960.

Today, the world's leading manufacturers of pesticide products invest more than $3 billion annually into research and development of new products (Phillips McDougall). The pesticide treadmill has thus seen a rapid escalation in the input costs of pesticides (insecticides, herbicides and fungicides) that farmers need to use to protect their crops as part of their budget at the expense of other input costs such as labour costs.

The escalation in the development of new active ingredients and pesticide products have created huge problems where runoff frequently pollutes surrounding ecosystems, with unpredictable consequences. The destabilization includes complex balances between predator (birds, mice, insects) and prey species (worms, insects) that is the natural occurring pest control system. The extensive use of pesticides also includes the loss of biodiversity and thus an erosion of soil quality which in turn can lead to a large drop in crop yields and create problems of food security. Moreover, there is compelling evidence that pesticides have a severe impact on the enjoyment of human rights which includes the right to work and live in a safe environment including the right to health[74].

Recognising the ecological and health problems posed by pesticides the EU made changes to the regulatory regime and imposed more stringent data requirements, and the application of complex technical guidance procedures for risk assessment, resulting in fewer new active substances being registered in the EU. The EU's re-registration process has led to the removal of over half of the pesticide active ingredients (293 out of 499). Countries such as Belgium, Denmark, Switzerland, Italy and Netherlands adopted explicit Pesticide Reduction Policies[75]. South Africa by contrast has more than 500 registered active ingredients (of the 600 available) for agriculture which is growing on a yearly basis[76].



While the EU bans the use of hazardous pesticides for use within its own boundaries it uses developing countries as its dumping ground for toxic chemicals[77]. African countries are facing an increasingly toxic future.

In 2018, Africa imported nearly 7,500 tonnes of pesticides containing 25 hazardous substances banned in Europe. Among the twenty African importers, Morocco and South Africa received by far the continent's largest volumes, followed by Egypt, Sudan and Senegal.

Public Eye. Brazil, South Africa, Ukraine: high-risk destinations. 10 September 2020

Agroecology is now considered as an alternative to the industrial model of agriculture in which pesticides are widely used. More and more farmers around the world are turning away from pesticide-intensive, single-crop farming in favour of organic agricultural practices embracing a diversity of crops and farming either with less or without any pesticides[78].

Agroecology aims to replace chemicals with biological materials found naturally within the environment. In this sense it promotes agricultural practices that are suited to local environments, which allows for a biological interaction between different crops and natural pests which at the same time builds up the long-term fertility of the soil. Agroecology combines traditional knowledge with the findings and methods of modern science. Unlike the agro-industrial model which promotes the growing of crops often unsuited to the local environment and attracting pests that normally do not occur in such environments. In order for the agroecological model to succeed in moving away from pesticide production it reintroduces crop diversity as an alternative to monoculture - cultivation of a single crop on vast tracts of land. In parts of the Africa regions food crisis has been its adoption of new maize varieties and the general acceptance of mono-cropping which covers up to 70% of some African country farmlands leading to a fall in the yields.

Agroecology is the "ecology of the food system" and a farming approach that is inspired by natural ecosystems. It combines local and scientific knowledge and applies ecological and social approaches to agricultural systems, focusing on the interactions between plants, animals, humans, and the environment. Agroecological methods can also help farmers cope with climate change by enhancing resilience.

Organic Without Boundaries, www.organicwithoutboundaries.bio

In east Africa about 96,000 farmers have responded by adopting a "push-pull" system for dealing with problematic pests and weeds. The farmers planted maize alongside fodders and wild grasses that "push" pests away, or "pull" them towards certain plants. The famers maize yields have increased from an average of 1 to 3.5 tonnes per hectare without the use of chemical insecticides and with minimal external inputs. In Kenya 400 farmers are replacing single-crop maize to drought-resistant and nutritious sorghum and millet, intercropped with legumes boosting yields and fetching a better price for their crops. Elsewhere in Brazil, thousands of hill farmers using mulch (organic material such as compost) to cover crops made up of legumes (various types of beans) and grasses saw their maize yields jump from 3 to 5 tonnes per hectare without using chemical fertiliser[79]. According to Bio Watch, South Africa, agroecology practices amongst small holder farmers have been successfully put to work in northern KwaZulu-Natal (KZN). These farming methods are being pioneered by women using traditional knowledge systems. Women have been able to preserve seed banks with traditional varieties of beans and maize (which are more drought resistant), engage and integrate a diversity of crops. Plants such as the aromatic shrub lemon bush (umsuzwane) and ginger bush (iboza) are used as natural insect repellants.

The harvest is also stored in a room with a fire to get rid of pests (umshayo). Unlike industrial agriculture which requires large tracts of land to allow for mechanisation, the small farmers close planting of the varieties of fruit and vegetables, provide a natural barrier to weeds and retains moisture in the soil[80]. In this way small farmers produce 20-60% more produce per unit farmed and because they use fewer inputs their farming methods are more productive[81].

The Food and Agriculture Organization estimates that approximately 821 million people are currently affected by hunger. An additional two billion people are suffering from micronutri-ent deficiencies, lacking key vitamins and minerals. In Cuba, it is estimated that agro-ecologi-cal practices are used in 46-72% of peasant farms, generating over 70% of the domestic food production. Based on the gathering of evidence, scientists at the International Assessment of Agricultural Knowledge, Science and Technology for Development believe that agroecology is a viable alternative to the pesticide intensive agro-industrial model of farming[82].

Recommendations

- The DAFF needs to open for public review the dated Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act No. 36 of 1947 in order to bring it in line with the South African constitution and bill of rights.

- The Department of Agriculture, Forestry and Fisheries (DAFF) should review the registration and approval of glyphosate in South Africa and implement a ban in 2021.

- The South African government needs to pass a law prohibiting the import of active ingredients and pesticide products that are not approved in the EU or other countries. DAFF should adopt the stringent European Union regulatory regime to ensure an effective pesticide reduction process.

- The South African government must extend the mandate of Product Export Control Board (PPECB) to include local fresh produce in its quality inspection of pesticide residues.

- The National Department of Health needs to set up adequate evaluation and monitoring systems to record the extent of acute and chronic poisonings in South Africa.

- The Department of Labour, DAFF, Department of Health and the National Institute for Occupational Health must establish a comprehensive system to assess, monitor and report on the health of farm workers on an annual basis.

- DAFF must take responsibility in the provision of information services related to pesticides (active ingredients and maximum residue levels) to farmers. The information system must be independent of industry, based upon science and consider South Africa's commitment to Sustainable Development.

- DAFF should convert some of the state farms to experiment with the agroecological model of farming. It should furthermore, direct some of its research and development budget towards alternatives to pesticides.

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Annexure A: International And National Networks That Campaign Against The Use Of Pesticides

- Africa Centre for Biodiversity (South Africa)
  https://www.acbio.org.za/

- Alliance for Food Sovereignty in Africa (AFSA)
  https://afsafrica.org/

- Bio Watch (South Africa)
  https://biowatch.org.za/

- Pesticide Action Network International (Germany)
  http://pan-international.org/europe/

- Public Eye (Swizerland)
  https://www.publiceye.ch/

- Surplus People's Project (South Africa)
  http://spp.org.za/

- Zambia Alliance on Agroecology and Biodiversity (ZAAB)
  https://zambianagroecology.org/