South Tyrol, October 2017

Playground contamination study in South-Tyrol

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Contents

1. Introduction

Pesticides or herbicides are used wherever cultivated plants need to be protected against pests and competing vegetation on farmland, public parks and private gardens. As the term “pesticide” suggests, these substances work by killing or repelling creatures seen as pests, or by preventing their growth and reproduction.[1] Depending on the group of creatures and plants to be combatted, we mainly distinguish between *fungicides* (prevents fungal infestions), herbicides (combats plants, e.g. “weeds” on the base of the fruit tree trunk) and *insecticides, acaricides* (combats ticks and mites). Synthetic active substances are mainly used in conventional farming and in private gardens, and natural active substances (e.g. copper salts and sulphur compounds as fungicides) find their main use in organic farming.

Where pesticides are applied across large areas, the phenomenon of unwanted aerosols drifting onto non-target areas becomes a major issue, raising questions of environmental protection and the health of residents.[2] Article 4 of EU Directive 2009/128 provides for the adoption of National Action Plans to set up “their quantitative objectives, targets, measures and timetables to reduce risks and impacts of pesticide use on human health and the environment …”. The corresponding Italian Legislative Decree of 14.8.2012 n.150, Art.6 “Piano d'azione nazionale per l'uso sostenibile dei prodotti fitosanitari” provides for the implementation of this Directive in Italy. In this context, the aim should also, and indeed above all, be to clarify the extent to which unwanted pesticide contamination could be expected in an area. This is the question demanding the attention of the umbrella organisation for nature conservation and environmental protection in South Tyrol.[3]

The first consideration of this study on behalf of the umbrella organisation is to test pesticide contamination in locations where there are as many sources for pesticide drift as possible.[4] A glance at the data shows that 5% of the area of South Tyrol is used for fruit and wine growing (approx. 24,600 ha, with 4% fruit and 1% grapes, as of 2010)[5], which is concentrated in the valleys and lower slopes of the Etsch Valley between Salurn and Mals, as well as the lower and middle Eisack Valley (especially around Brixen), i.e. in the main urban conurbations within South Tyrol. Arable farming (approx. 4,000 ha, <1%) and domestic gardens (approx. 200 ha, <<1%), also areas of potential pesticide use, make up a negligible percentage (as of 2010).

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[1] SCHUDEL P., 2008: Ökologie und Pflanzenschutz. Grundlagen für die Verwendung von Pflanzenschutzmitteln. Umwelt-Wissen Nr. 0809. Bundesamt für Umwelt, Bern.

[2] CHILD PROOFING OUR COMMUNITIES, 2001: Poisoned Schools: Invisible Threaths. Visible Actions.Poisoned School Campaign.

[3] FISHEL F. M. & FERRELL J. A., 2010: Managing Pesticide Drift, IFAS Extension PI232. University of Florida.

[4] SCHAFER K.S, EMILY C. & MARQUEZ M.A, 2012: A Generation in Jeopardy. How pesticides are undermining our children’s health & intelligence. Pesticide Action Network North America. S.22 www.panna.org/sites/default/files/KidsHealthReportOct2012.pdf

[5] LANDESINSTITUT FÜR STATISTIK (ASTAT), 2016: Südtirol in Zahlen 2016. Autonome Provinz Bozen-Südtirol.

This means that it makes perfect sense to limit a study designed to look at the extent of pesticide contamination on non-target areas in South Tyrol to contamination caused by fruit and wine cultivation. In South Tyrol, around 95% of the fruit producers use conventional farming methods, whilst around 5% are organic or biodynamic farmers based on the relevant guidelines (e.g. Bioland, Demeter, Bund Alternativer Anbauer …). 95% of conventional producers follow the AGRIOS guidelines (Arbeitsgruppe für den Integrierten Obstanbau in Südtirol). Conventional methods are also known as integrated fruit growing and are mainly supported by synthetic pesticides, even though a range of measures have been introduced to restrict their use. [6]

This starting point and the pesticide debate, which has come to a head in South Tyrol in recent months, prompted the umbrella organisation for nature conservation and environmental protection into commissioning this study.

2. Objective and problem

The intensive fruit and wine growing areas which cover virtually all of the cultivated land in the main valleys of South Tyrol (Etsch Valley between Salurn and Meran, large parts of Vinschgau, parts of the Eisack Valley) are intertwined with the main population areas in South Tyrol. Villages like Schlanders, Latsch, Naturns, Lana, Terlan, Kaltern, Kurtinig, Salurn and Natz to name just a few are completely surrounded, and even partly infiltrated by intensive fruit and wine growing.

Added to this is the matter of pesticide use in public gardens and parks, as well as in numerous private gardens. It begs the question to what extent non-target areas for pesticide treatment are contaminated by its use in such locations. [7] [8]

The aim of this study is to test how far non-target areas in residential areas on the valley floors of the main South Tyrol valleys are contaminated by the use of pesticides in fruit and wine growing. To put it another way, is the assumption that pesticide drift is a matter of just a few metres correct?

Non-target areas are considered to be all areas outside farmland treated with pesticides. These areas must be narrowed down further however for sampling reasons. For the following reasons, children's playgrounds have been selected as test areas:

[6] www.agrios.it

[7] Nuyttens D., De Schampheleire M., Baetens K. & Sonck B., 2007: The influence of operator controlled variables on spray drift from field crop sprayers. Transactions of the ASABE (American Society of Agricultural and Biological Engineers),50 : 1129-1140.

[8] Vercruysse F., Steurbaut W., Drieghe S. & Dejonckheere W., 1999: Off target ground deposits from spraying a semi-dwarf orchard. Crop Protection 18: 565-570.

- As with all public places, playgrounds should place special emphasis on the health of the people who use them. The public demand that politicians and public administrators work to prevent any contamination by toxins, especially if they are highly toxic.
- (Small) children may be particularly sensitive to contamination from pesticides.

The actual question posed by this study is:

"Can evidence of pesticides be found on grassed areas of children's playgrounds in the fruit growing area of South Tyrol during the main spraying period?"

3. Method

3.1 The study area

The study is concentrated on the main fruit and wine growing areas of South Tyrol (Fig. 1, Annex 1). These are

- the valleys of the South Tyrol lowlands between Bozen/Bolzano and Salurn/Salorno
- the Upper Etsch, the Etsch Valley between Bozen/Bolzano and Meran/Merano
- and the valleys of Vinschgau between Töll/Tel and Mals
- as well as the central Eisack Valley around Brixen/Bressanone and the high plateau of Natz-Schabs.

The selection of these specific areas is designed to test the hypothesis that potential contamination is not carried over a wide area by the wind, but through drift which has a more local effect. Whether drift actually occurs over distances of a few metres as the outline of a study by the Free University of Bozen-Bolzano suggests, or in fact over greater distances, as defined in the study's objectives, can be tested within the specified areas. [9]

[9] DALLEMULE C., 2014: Versuche zur Effizienz abdriftmindernder Maßnahmen unter Freilandbedingungen im Obervinschgau. Agrarwissenschaften und Agrartechnologie Fakultät für Naturwissenschaften und Technik Akademisches Jahr 2013/2014. S. 46.

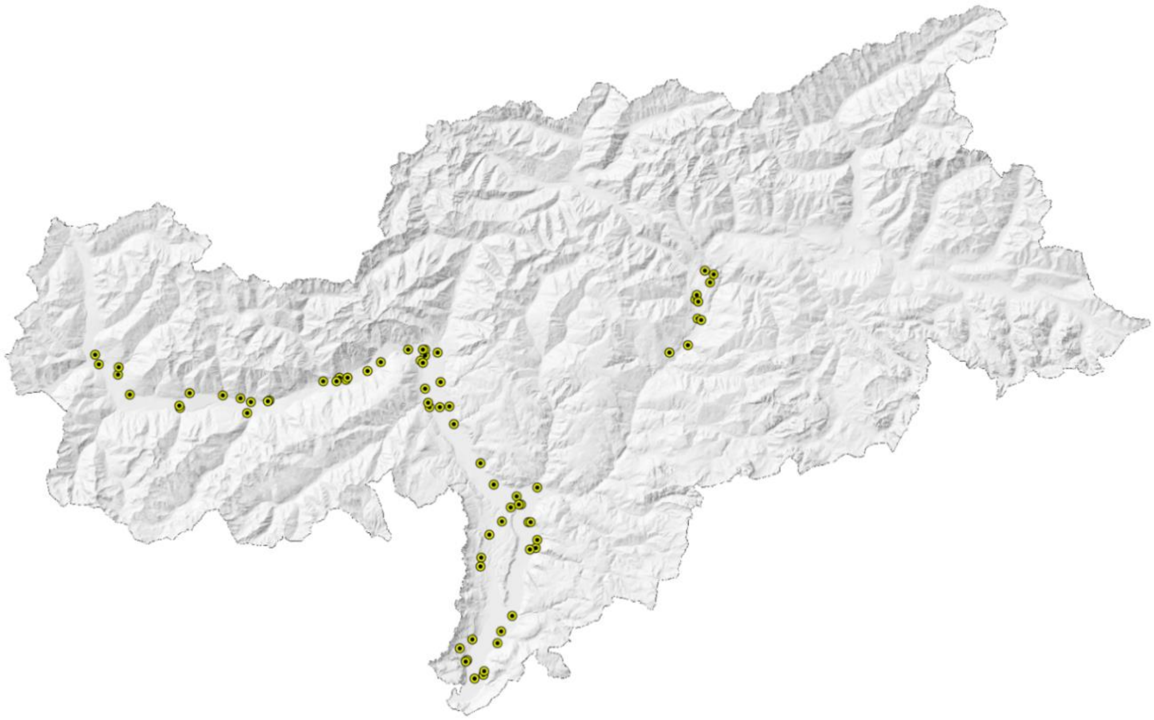

Fig. 1 Location of studied children's playgrounds in the South Tyrol fruit and wine growing area

3.2 Selection of sample sites

Prior to the study, as many public playgrounds as possible in the study area were scouted using the https://playground.findnear.by/de website, the municipality websites and via the VKE home page, but also with the help of local contacts, and were located using satellite images (http://gis2.provinz.bz.it/geobrowser/, Annex 1), so that they could be pinpointed for sampling.

The number of test areas or samples (extent of the sampling) was determined in advance by the available private finance with which the sampling and sample analysis had to be funded. In the end, funds were found for 71 samples. This is well above the threshold for a viable sample size.

The 71 playgrounds which were actually sampled in the end were selected at random. The selection process therefore did not focus on the playgrounds closest to treated land, but a mixture of close as well as distant playgrounds were taken into account. In order to ensure that close as well as distant playgrounds were represented equally in the sample, the distance of the study areas from the nearest fruit and wine growing areas was incorporated into the randomisation process. Before samples were taken, two groups "close (to intensive culture)" and "far (from intensive culture)" were formed and the same number of playgrounds allocated to both groups. All playgrounds situated 50 m or less from the nearest fruit/wine growing area were put into the "close" group, all those further away into the "far" group. The random selection of playgrounds (randomisation) was made within both these groups. All public playgrounds listed by the above sources in the fruit and wine growing areas of the Etsch Valley between Salurn and Mals as well as the central Eisack Valley, 125 in total, were available for selection. Thanks to the random selection of 71 test playgrounds, it was possible that municipalities were represented by several cultivated areas or none at all.

The 71 samples were finally allocated to the total study area, so that:

a) all four valley communities were sampled according to the size of their cultivated area and

b) an equal share of the playgrounds were allocated to the two categories “close” und “far” (Annex 1). The distance of the playground to the nearest fruit or wine growing area was determined using satellite images (http://gis2.provinz.bz.it/geobrowser/) and checked again during the respective sampling (see below). There was in fact a possibility that in some cases the situation may already have changed in relation to the satellite image, with the agricultural land moving closer to the playground. The opposite situation was improbable and did indeed not arise.

c) This method gave us the following selection of sample sites:

- 21 samples in Vinschgau (10 close, 11 far),
- 20 in the Etsch Valley (10/10),
- 20 in Unterland/Überetsch (10/10) and
- 10 in the Eisack Valley (4/6)

The site selection therefore corresponds to a stratified random sample, where the valley community (“Talschaft”) and the distance to the nearest fruit and wine grower are used as strata in order that playgrounds both close to and far from cultivated land are equally represented.

3.3 Sampling and analysis

3.3.1 Time requirements

The timing of the sampling was selected so that the following conditions were in place wherever possible:

- Main season for pesticide application in the relevant valley community
- Rain-free period 4-5 days before taking the samples. This prevents pesticides which may have settled on the sample (tuft of grass) several days beforehand from being washed away in the meantime by rain.

3.3.2 Sampling requirements

The study design also meant that the sampling was completely random in the sense that there was no information available on whether pesticides had been applied shortly beforehand (e.g. several hours or days) close to the sampled playgrounds. Such specific sampling would not have been feasible, especially as farmers and other pesticide users do not apply pesticides according to an accessible or publicly available schedule and site plan. For logistical reasons (large number of playgrounds, large study area) it would have been equally impossible to expect local contacts to inform us of the time at which the pesticide was applied close to the target playground, and to then dispatch the sample team to take a sample.

3.4 Procedure

3.4.1 Sampling

The following sampling dates were set according to the meteorological conditions during the study period in question based on time constraints (see 3.3.1):

- Unterland/Überetsch: 16 May 2017
- Etsch Valley: 17 May 2017
- Eisack Valley: 18 May 2017
- Vinschgau: 22 and 23 May 2017

Sampling was carried out by the accredited *BioProgramm* office in Padova (www.bioprogramm.it), which was commissioned by the umbrella organisation for nature conservation and environmental protection. Depending on the condition of the site, grass tufts were taken at several – at least 2, at most 3–4 – points in each playground, and combined to produce a representative mixed sample. The grass was manually torn off using sterile disposable gloves and without tools (e.g. scissors) to prevent contamination of subsequent samples from other playgrounds. Separated according to playground, the mixed samples were kept in tear-resistant freezer bags, from which the air was removed by applying pressure. The bags were sealed twice with a wire tie and labelled twice (location and sample number) (Fig. 2).

The samples were stored at room temperature and submitted on the morning of the following day together with the list of samples, which ensured that they were clearly assigned, and together with the request for the laboratory study, to the Environment Agency of the Autonomous Province of Bozen/Bolzano South Tyrol (cf. 3.4.3).

Fig. 2 Taking grass samples (above and bottom right) and keeping these in an airtight plastic bag (bottom left).

3.4.2 Chemical Analysis

The chemical analysis of the grass samples was performed by the accredited laboratory for food analyses 29.7 at department 29 of the Environment Agency of the Autonomous Province of Bozen/Bolzano – South Tyrol using the method UNI EN 15662: 2009 (Foods Of Plant Origin - Determination Of Pesticide Residues using GC-MS and/or LC-MS/MS following Acetonitrile Extraction/Partitioning and Clean-up by Dispersive SPE – QuEChERS method). The standard method covers a range of 315 active substances (Annex 2).
The analysis took place within the period from the end of May to the start of June 2017. The samples from Unterland and the Etsch Valley were analysed between 18 and 19 May and 3 June (i.e. within 2 weeks after the samples were taken), those from the Eisack Valley between 22 May and 12 June (i.e. within 3 weeks), those from Vinschgau between 24 May and 12 June (i.e. within 3 weeks). The results of the studies were sent by email to the umbrella organisation for nature conservation and environmental protection.

4. Results and Discussion

Contamination was found in 32 (= 45%) of the 71 studied playgrounds in the study area, none in the other 39. The largest percentage of contaminated areas were located in Vinschgau (76%), followed by the Etsch Valley (40%) and the Eisack Valley (40%). In Überetsch/Unterland, 20% of the playgrounds were contaminated.
The following picture emerged with regard to the categories "close" and "far" (Fig. 3):

- ➔ In Vinschgau. all "close" playgrounds were contaminated, with around ½ of those in the "far" category (= 6 = 55%) being contaminated.
- ➔ In the Etsch Valley, the same result could be seen in both categories: pesticides were found in 4 (= 40%), and none in 6 (= 60%).
- ➔ In Überetsch/Unterland, 3 areas (= 30%) in the "close" category were contaminated and only one (= 10%) in the "far" category.
- ➔ In the Eisack Valley, all 4 areas (= 100%) in the "close" category were contaminated, but none of the 6 (= 60%) areas in the "far" category.

If we compare the contaminated playgrounds with the total number of public playgrounds located in the study area (= 125, 59 of these in the "close" category and 66 in the "far" category), we see that 36% of the playgrounds close to fruit/wine growing areas were contaminated, whilst contamination was found in 17% of the playgrounds far from these areas. Since the statistical population is ± half of the "far" type and half of the "close" type, and the selection also consisted of around 50% of "far" playgrounds and 50% "close" playgrounds, the distribution is the same in the statistical population and in the sample, with the result that the selected playgrounds are representative of all playgrounds in the studied municipalities.

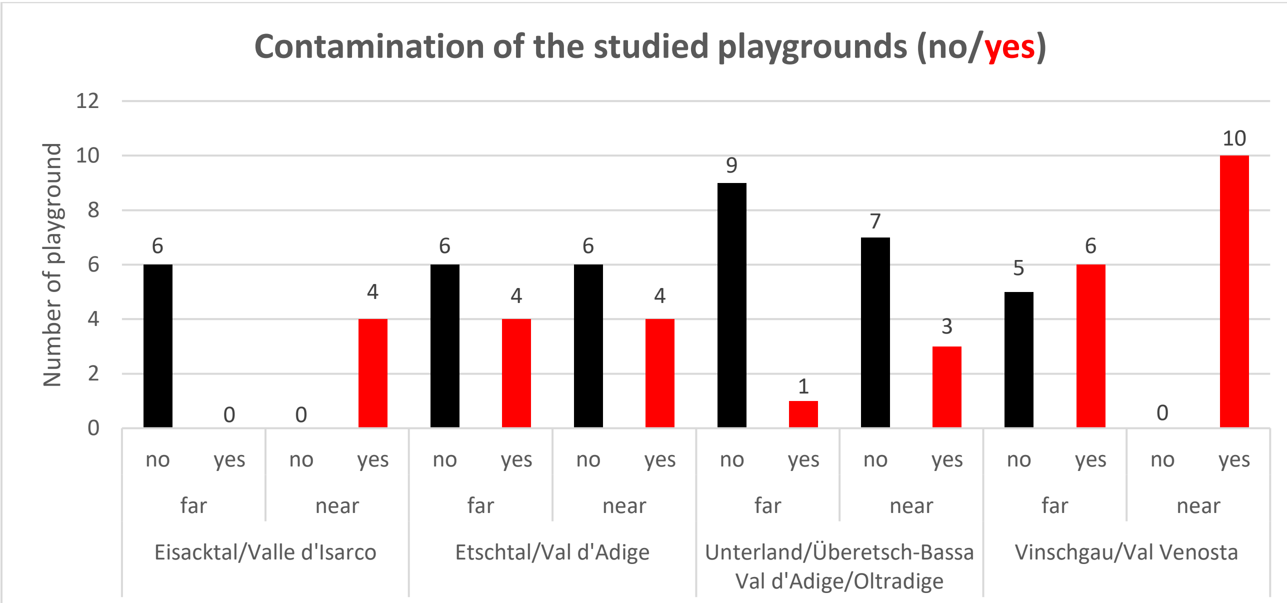

Fig. 3 Evidence of residues (yes/no) on public playgrounds in South Tyrol separated according to valley communities and according to their distance (far/near) to fruit/wine growers. For details see text.

14 different active substances were found in total. These included 6 fungicides (difenoconazole, dodine, fluazinam, penconazole, penthiopyrad, tetraconazole), 5 insecticides (chlorpyrifos-methyl, cypermethrin, imidacloprid, methoxyfenozide, phosmet) and a herbicide (oxadiazon). A preservative (2-phenylphenol) was also found in one case, and a disinfectant (benzalkonium chloride), which was found in four samples.

2-phenylphenol is a fungicide which is used for preserving citrus fruit. We can only speculate on why this active substance was found in a playground. In theory, it may have come from a discarded citrus fruit peel. Benzalkonium chloride is not authorised in the EU as a pesticide, but is often found in disinfectants, and therefore is unlikely to have occurred via drift. Its presence in playgrounds – and again this is speculation – could be explained by playground visitors contaminating the grass with an active substance from a spray or a cloth soaked in disinfectant.

The remaining 12 active substances are pesticides and it is highly probable that they come from fruit and wine growing (cf. conclusions below). The most frequently found by far were the insecticide phosmet and the fungicide fluazinam in a total of 18 playgrounds. In Vinschgau and the Etsch Valley, they were also found in several "far" category playgrounds (Fig. 4). Of the remaining 10 pesticides, only penthiopyrad, which occurred in grass samples from 6 playgrounds, was to any extent significant. All other pesticides were present in less than 5 samples (Fig. 4).

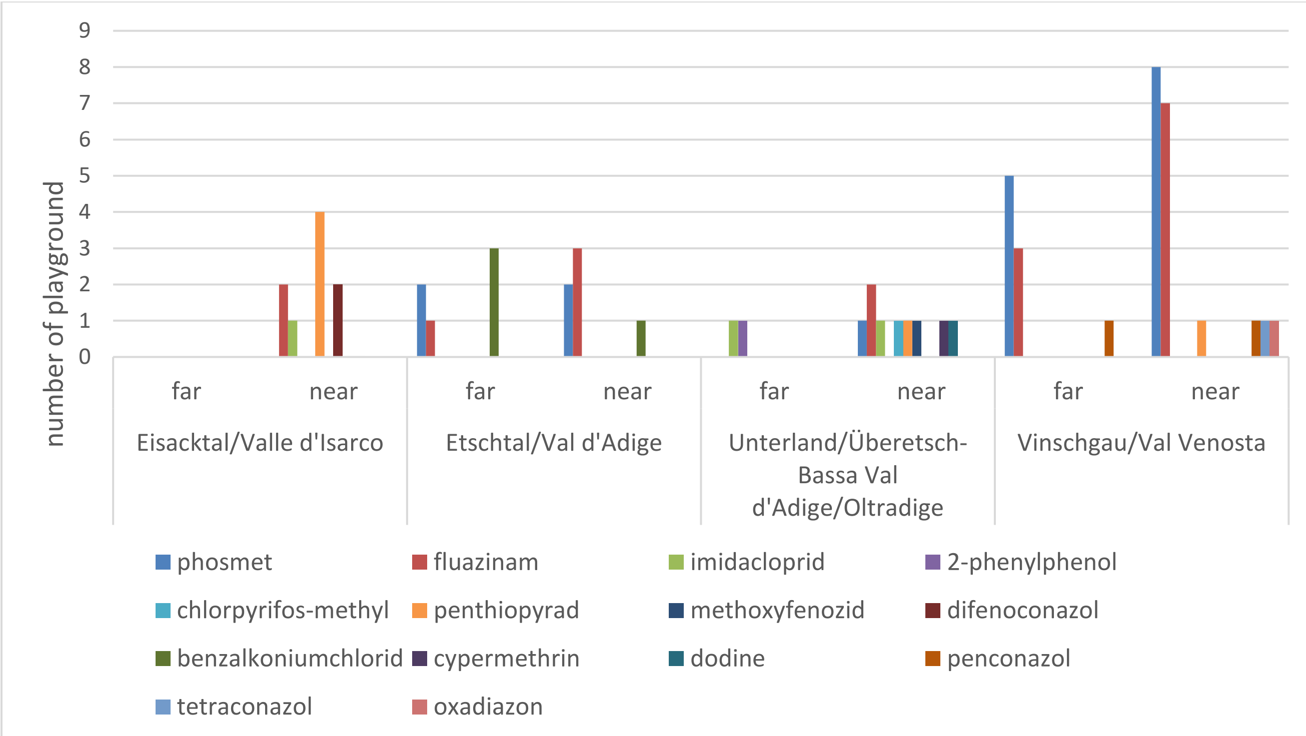

Fig. 4 Active substances found in grass samples from South Tyrol playgrounds separated according to valley communities and according to their distance (far/close) from fruit/wine growers.

Only the 12 pesticides found are examined in more detail below, i.e. samples in which only 2-phenylphenol or benzalkonium chloride have been found (see above), are excluded from the results. In total, pesticide residues were found in 29 playgrounds.

Plotting the residue levels (= total pesticides found in the sample) of the 29 playgrounds contaminated by pesticides against their absolute distance to the nearest fruit/wine growing land (cf. Annex 1), gives us the following: 19 (= 66%) of the contaminated playgrounds lie between 15 and 50 m from the nearest cultivated land, and 10 (= 34%) more than 50 m away, of which 3 are more than 100 m away and 1 is even 370 m away (Fig. 5).

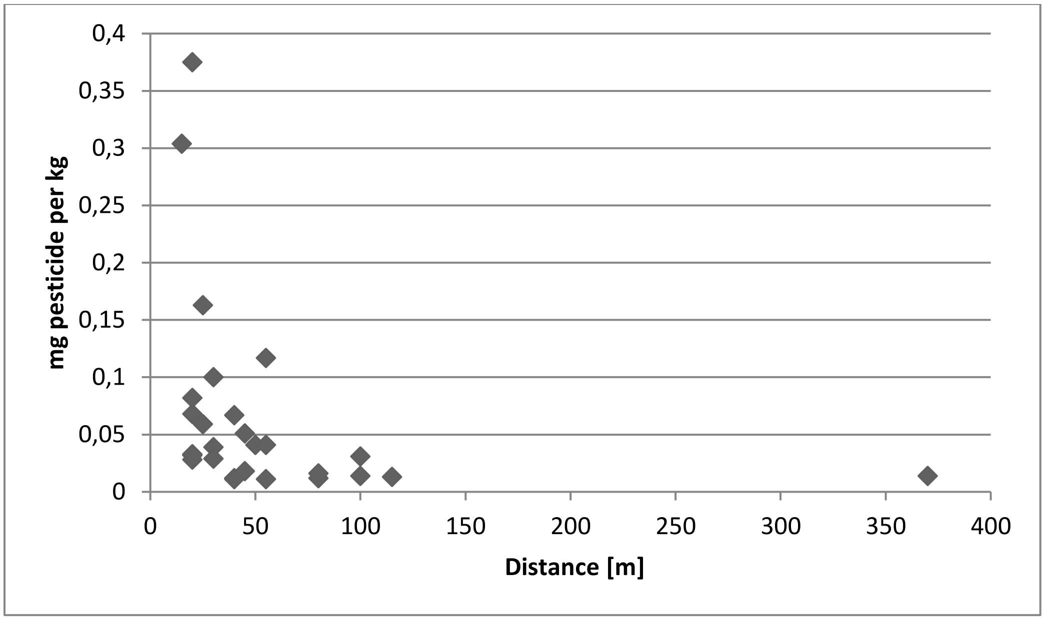

Fig. 5 Pesticide residue levels found in South Tyrol playgrounds in relation to their absolute measured distance to the nearest fruit/wine growing land. The one "anomaly" of 2,024 mg/kg were not taken into account for reasons of scale

In the 29 grass samples contaminated by pesticides, only one pesticide was found in 12 (= 42%), and at least two in 17 (= 58%) (Fig. 6).

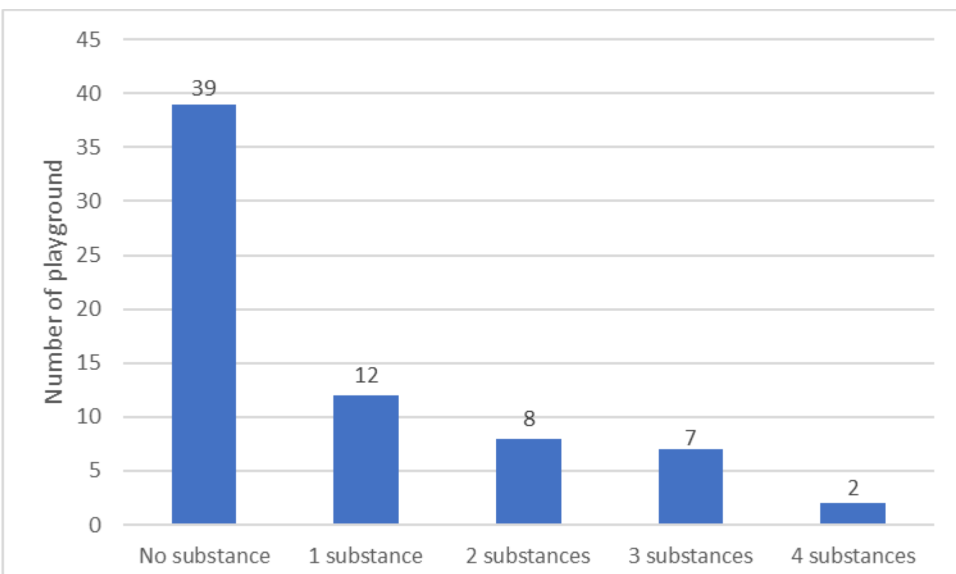

Fig. 6 Tested grass samples on 71 South Tyrol playgrounds: Distribution according to the number of pesticides from the 12 pesticides found in total.

5. Conclusions

29 of the 71 sampled children's playgrounds, located in the South Tyrol valleys dominated by intensive fruit and wine growing, were contaminated by pesticides. The assumption is therefore that widespread pesticide contamination of non-target areas on the valley floors of the fruit and wine growing areas can be expected. The relationship between contamination found and distance to the nearest orchard or vineyard shows that the phenomenon of drift not only occurs within the range of a few metres: All contaminated playgrounds were located more than 15 metres from the nearest cultivated land, with 10 of them more than 50 m away, and 4 of these in turn more than 100 m away. These figures must also be put into perspective when we consider that there is no information available on whether the pesticides found contaminated the playground from the nearest cultivated land, or from land further away.

Even if no direct proof of the origin of the active substances found can be supplied, the suspicion remains that the main cause lies in farming, for the following reasons: The main pesticides found are typically used in fruit growing. If the pesticides had been used in adjoining private gardens, then drift is highly improbable, not least because no spraying equipment with the corresponding spray radius is used there, but only small spray bottles which are directed at the specific plants which need to be treated. Neither can the presence of these pesticides in playgrounds be explained with them coming from adjacent public gardens and parks, because the national action plan limits the use of synthetic pesticides there since 2016, and because municipalities such as e.g. Meran/Merano and Bozen/Bolzano can also provide proof of compliance with this limitation.

6. Cited literature

CHILD PROOFING OUR COMMUNITIES, 2001: Poisoned Schools: Invisible Threaths. Visible Actions.Poisoned School Campaign. www.beyondpesticides.org/assets/media/documents/schools/publications/Poisoned_Schools.pdf

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7. Index of figures

8. Annex

Various annexes to the study are shown below.

Annex 1: South Tyrol children's playgrounds sampled during the 2017 contamination study

Bereich/Talschaft	Gemeinde	Spielplatz	geograph. Koordinaten (WGS84)	Kategorie (nahe/fern)	Abstand zur nächsten Obst/Wein baufläche [m]
Eisacktal	Brixen	Albeins, Spielplatz am Aferer Bach	46.676237, 11.631753	fern	60
Eisacktal	Brixen	Brixen, Ing. Etzel-Straße	46.709327, 11.650800	fern	230
Eisacktal	Brixen	Milland, Linker Eisackdamm	46.707140, 11.657914	fern	350
Eisacktal	Feldthurns	Feldthurns, Landesstraße	46.66796, 11.597555	fern	130
Eisacktal	Natz-Schabs	Schabs, Ostrand des Dorfes	46.769246, 11.667921	fern	100
Eisacktal	Vahrn	Vahrn, Wiesenweg	46.7334896, 11.6484399	fern	130
Eisacktal	Natz-Schabs	Natz, Oberbrunnergasse	46.754433, 11.676790	nahe	40
Eisacktal	Natz-Schabs	Viums, St. Magdalena-Straße	46.764787, 11.683809	nahe	50
Eisacktal	Vahrn	Neustift, Stiftstraße	46.7392277, 11.6505302	nahe	25
Eisacktal	Vahrn	Vahrn, linkes Eisackufer, "Wasserschöpfe"	46.731386, 11.653715	nahe	30
Etschtal	Bozen	Bozen, Talferwiesen	46.503359, 11.348621	fern	60
Etschtal	Bozen	Bozen, Ortlerstraße	46.482817, 11.317706	fern	115
Etschtal	Gargazon	Gargazon, Winklerweg	46.585919, 11.200160	fern	140
Etschtal	Lana	Lana, Bozner Straße gegenüber Lido	46.608357, 11.175023	fern	100
Etschtal	Meran	Sinich, Lazzeri-Park, Staatsstraße	46.639869, 11.177636	fern	55
Etschtal	Meran	Meran, Obermais, Erholungszone Lazag, Lazagw	46.676898, 11.174121	fern	80
Etschtal	Meran	Meran, Karl Wolf-Straße	46.680820, 11.150255	fern	95
Etschtal	Meran	Meran, Schießstandweg	46.666972, 11.141956	fern	115
Etschtal	Meran	Meran, Untermais, Zueggpark	46.664392, 11.146479	fern	175
Etschtal	Meran	Meran, Mainhardstraße	46.673773, 11.150967	fern	420
Etschtal	Algund	Algund, Steinach-WEg, NW des Dominikanerkl	46.681997, 11.120021	nahe	25
Etschtal	Bozen	Bozen, Firmian-Park	46.493011, 11.310949	nahe	35
Etschtal	Bozen	Bozen, Wohnbauzone Casanova	46.482430, 11.314464	nahe	45
Etschtal	Burgstall	Burgstall, Romstraße	46.608333, 11.191833	nahe	15
Etschtal	Lana	Lana, Andreas Hofer-Straße	46.613894, 11.152841	nahe	30
Etschtal	Lana	Lana, Kirchstraße	46.608043, 11.155627	nahe	30
Etschtal	Meran	Gratsch, Laurinstraße	46.680664, 11.146358	nahe	15
Etschtal	Terlan	Siebeneich, Bahnhofstraße	46.508887, 11.269006	nahe	20
Etschtal	Terlan	Terlan, Petersbach	46.535493, 11.246723	nahe	20
Etschtal	Tscherms	Tscherms, Trojenweg	46.631421, 11.148546	nahe	20
Unterland/Überetsch	Auer	Auer, Sportzone Schwarzenbach	46.342462, 11.296257	fern	220
Unterland/Überetsch	Eppan	Frangart, Sigmundskroner Straße	46.478709, 11.298964	fern	100
Unterland/Überetsch	Eppan	Gand, Lambrechtweg/ Steinackerweg	46.445836, 11.258225	fern	185
Unterland/Überetsch	Leifers	Steinmannwald, Brenner-Straße	46.437025, 11.345249	fern	60
Unterland/Überetsch	Leifers	St. Jakob, Richard Wagner-Straße	46.460040, 11.330848	fern	150
Unterland/Überetsch	Leifers	St. Jakob, Spielplatz Pfarrei St. Jakob	46.460104, 11.334381	fern	210
Unterland/Überetsch	Margreid	Margreid, Pfarrgasse	46.286371, 11.209220	fern	70
Unterland/Überetsch	Neumarkt	Neumarkt, Gänsplätzen	46.308143, 11.268059	fern	60
Unterland/Überetsch	Neumarkt	Vill, Rheinfeldenstraße	46.323313, 11.275462	fern	195
Unterland/Überetsch	Neumarkt	Laag, Spielplatz Pinara, Parkstraße/Föhrenweg	46.273967, 11.241494	fern	200
Unterland/Überetsch	Eppan	Girlan, Lammweg	46.461562, 11.282029	nahe	15
Unterland/Überetsch	Kaltern	Kaltern, Spielplatz Prey-Klavenz, Penegalstraße	46.416946, 11.242790	nahe	10
Unterland/Überetsch	Kaltern	Kaltern, Spielplatzi Lavardi, Barleitweg	46.406164, 11.241236	nahe	15
Unterland/Überetsch	Kurtatsch	Kurtatsch, Obergasse	46.314166, 11.222232	nahe	15
Unterland/Überetsch	Kurtatsch	Penon, In der Wies	46.303523, 11.199563	nahe	20
Unterland/Überetsch	Kurtinig	Kurtinig, Moosweg	46.264203, 11.224331	nahe	30
Unterland/Überetsch	Leifers	Leifers, Spielplatz Marconi, Marconi-Straße	46.425484, 11.332227	nahe	25
Unterland/Überetsch	Leifers	Leifers, Dante-Straße/Unterbergstraße	46.426806, 11.342578	nahe	25
Unterland/Überetsch	Margreid	Margreid, Spielplatz Angerle, Schmiedgasse	46.288326, 11.211235	nahe	35
Unterland/Überetsch	Neumarkt	Laag, Dante-Straße	46.269000, 11.241119	nahe	10
Vinschgau	Glurns	Glurns, nördlich außerhalb der Stadtmauer	46.671893, 10.553517	fern	100
Vinschgau	Laas	Laas, Quellenweg	46.615074, 10.700073	fern	55
Vinschgau	Laas	Laas, Schulweg	46.61821, 10.697967	fern	120
Vinschgau	Latsch	Goldrain, Goldrainer See	46.62029, 10.83022	fern	55
Vinschgau	Latsch	Morter, Vigilius-Straße	46.606782, 10.82183	fern	80
Vinschgau	Latsch	Latsch, Andreas Hofer-Straße, bei der Etsch	46.621398, 10.863143	fern	130
Vinschgau	Mals	Mals, Spielplatz beim Bahnhof	46.684303, 10.546963	fern	210
Vinschgau	Naturns	Kompatsch, Färberweg	46.648534, 10.993333	fern	55
Vinschgau	Schluderns	Schluderns, Quairstraße	46.658817, 10.5878571	fern	115
Vinschgau	Schluderns	Schluderns, Saldurbach	46.66781, 10.58937	fern	220
Vinschgau	Schluderns	Spondinig, bei den Fischerteichen	46.633468, 10.60812	fern	370
Vinschgau	Laas	Allitz, Nordteil des Dorfes	46.633751, 10.718355	nahe	20
Vinschgau	Latsch	Latsch, Bleibichl	46.62119, 10.860737	nahe	45
Vinschgau	Naturns	Tschirland, NW-Teil des Dorfes	46.643692, 10.987317	nahe	20
Vinschgau	Naturns	Staben, Spielplatz rechts an der Etsch	46.644141, 10.962575	nahe	25
Vinschgau	Naturns	Naturns, Flora Gustav-Straße (Jugendtreff Tenn	46.64836, 11.008066	nahe	40
Vinschgau	Naturns	Naturns, Bahnhofstraße Nähe Etsch	46.645899, 11.004466	nahe	40
Vinschgau	Partschins	Rabland, Saringstraße, links an der Etsch	46.666634, 11.068874	nahe	20
Vinschgau	Plaus	Plaus, Grobenweg	46.656360, 11.044874	nahe	20
Vinschgau	Schlanders	Vetzan, Beginn Auffahrt zum Hof Tappein	46.625394, 10.810524	nahe	20
Vinschgau	Schlanders	Schlanders, Sportzone Gröben	46.629413, 10.778965	nahe	45

Annex 2: List of tested active substances (Limit of detection: 0.01 mg active substance per kg) according to the template of the Laboratory of Food Analyses of the Autonomous Province of Bozen/Bolzano – South Tyrol.

Abamectine	Cloruro di didecildimetilammonio (DDAC)	Fention oxon solfossido	Metribuzin	Teflubenzuron
Acechinocil	Coumafos	Fention oxon sulfone	Miclobutanil	Teflutrin
Acefato	Cyantraniliprole	Fention ozono	Monocrotofos	Terbutilazina
Acetamipirid	Cymyazole	Fention solfone	Ometoate	Terbutilazina-desetil
Acibenzolar-S-metile	Deltametrina	Fention solfossido	o,p'-DDT	Terbutrina
Acrinatrina	Demeton-S-metilsolfone	Fentoato	Ossidemeton-metile	Tetraconazolo
Alacloro	Diazinon	Fenvalerate	Oxadiazon	Tetradifon
Aldicarb	Diclofluanid	Fipronil	Oxadixil	Tetrametrina
Aldicarb solfone	Dicloran	Fipronil solfone	Oxamil	TFNA
Aldicarb solfossido	Diclorprop	Flazasulfuron	Oxifluorfen	TFNG
Aldrin	Diclorvos	Flonicamide	Oxy Clordano	Tiabendazolo
Alossifop	Dicofol	Fluazifop	Paclobutrazol	Tiacloprid
Ametoctradin	Dicrotofos	Fluazifop-p-butile	Paraoxon	Tiametoxam (+Clot0ia.0n1idin)
Amisulbrom	Dieldrin	Fluazinam	Paraoxon metile	Tiodicarb
Amitraz	Dietil-m-toluamide (DEET)	Flubendiamide	Paration	Tiofanato metile
Amitraz (incl. metaboliti)	Dietofencarb	Fludioxonil	Paration metile	Tolclofos-metile
Atrazina	Difenilammina	Flufenoxuron	Pencicuron	Tolylfluanid
Atrazina-desetil (DEA)	Difenoconazolo	Flumetrina	Penconazolo	trans-Clordano
Atrazina-desisopropil (DIA)	Diflubenzuron	Fluopicolide	Pendimetalin	Triadimefon
Azinfos etile	Dimefox	Fluopyram	Pentacloroanilina	Triadimenol
Azinfos metile	Dimetilamminosolfotoluidide (DMST)	Fluquinconazolo	Pentaclorofenolo	Triazofos
Azossistrobina	Dimetoato	Flusilazolo	Penthiopyrad	Tricilazolo
Benalaxil	Dimetoato (+Ometoa0to.0)1	Flutolanil	Permetrina	Triclorfon
Benfuracarb	Dimetomorf	Flutriafol	Pimetrozina	Triflossistrobina
Benzalconio cloruro (BAC 10)	Dimossistrobina	Fluxapyroxad	Piraclostrobin	Triflumuron
Benzalconio cloruro (BAC 12)	Diniconazolo	Folpet	Pirazofos	Trifluralin
Benzalconio cloruro (BAC 14)	Ditianon	Formetanato	Piretrine	Triticonazolo
Benzalconio cloruro (BAC 16)	Diuron	Fosalone	Piridaben	Vinclozolin
Bifenile	Dodina	Fosfamidone	Pirimetanil	Zoxamide
Bifenthrin	Emamectina	Fosmet	Pirimicarb	2-Fenilfenolo
Bitertanolo	Endosulfan-alfa	Fosmet (+fosmetozono espr in0 .f0o1smet)	Pirimicarb desmetil	2,4-D
Bixafen	Endosulfan-beta	Fosmetozono	Pirimifos-etile	2,4-Dimetilanilina (DMA)
Boscalid	Endosulfan-solfato	Fostiazate	Pirimifosmetile	2,6-Diclorobenzamide
Bromacile	EPN	Foxim	Piriproxifen	3-Idrossi-carbofurano
Bromadiolone	Epossiconazolo	Heptenophos	p,p'-DDD	
Bromopropilato	Eptacloro	Imazalil	p,p'-DDE	
Bromuconazolo	Eptacloro epossido-cis	Imidacloprid	p,p'-DDT	
Bupirimate	Eptacloro epossido-trans	Indoxacarb	Procimidone	
Buprofenzin	Esaclorobenzene	Iprodione	Procloraz	
Cadusafos	Esaclorocicloesano alfa	Iprovalicarb	Profenfos	
Captano	Esaclorocicloesano beta	Isocarbofos	Prometrina	
Carbaryl	Esaclorocicloesano gamma (Lindano)	Isofenfos-metile	Propamocarb	
Carbendazim	Esaconazolo	Isoprotiolano	Propargite	
Carbetamide	Esazinone	Isoproturon	Propazina	
Carbofurano	Esfenvalerate	Kresoxim-metile	Propiconazolo	
Carbossina	Etion	lambda Cialotrina	Propizamide	
Carbosulfan	Etirimol	Linuron	Propoxur	
Carfentrazone etile	Etofenprox	Lufenuron	Proquinazid	
Cianazina	Etofumesato	Malaoxon	Protioconazolo	
Ciazofamid	Etoprofos	Malation	Protioconazolo-destio	
Ciclossidim	Etossazolo	Mandipropamide	Protiofos	
Ciflufenamide	Exitiazox	MCPA	Quinalfos	
Ciflutrin	Famoxadone	Mepanipirim	Quinoxifen	
Cimoxanil	Fenamidone	Meptildinocap	Quintozene	
Cipermetrina	Fenamifos	Metacrifos	Quizalofop-P-etile	
Ciproconazolo	Fenamifos solfone	Metaflumizone	Resmetrin	
Ciprodinil	Fenamifos solfossido	Metalaxyl	Rotenone	
cis-Clordano	Fenarimol	Metamidofos	Sebutilazina	
Clofentezina	Fenazaquin	Metamitron	Simazina	
Clomazone	Fenbuconazolo	Metazaclor	Spinetoram (XDE-175)	
Clorantraniliprolo	Fenbutatin ossido	Metconazolo	Spinosad (somma di spinosyn A e D, espre0s.s0a1 in spinosad)	
Clorfenapir	Fenhexamid	Metidation	Spirodiclofen	
Clorfenvinfos	Fenitrotion	Metiocarb	Spiromesifen	
Clorobenzilato	Fenoxicarb	Metiocarb solfone	Spirotetrammato	
Clorpirifos	Fenpirazamina	Metiocarb solfossido	Spiroxamina	
Clorpirifos-metile	Fenpiroximate	Metolachlor	Tau-fluvalinato	
Clorprofam	Fenpropatrin	Metomil	Tebuconazolo	
Clortal-dimetile	Fenpropidin	Metossicloro	Tebufenozide	
Clortalonil	Fenpropimorf	Metossifenozide	Tebufenpirad	
Clortiamid	Fention	Metrafenone	Tecnazene	