

Glyphotainted

A citizen-science zine about testing
for and avoiding the herbicide
Glyphosate in your food.

In the autumn of 2023 our studio began a European Commission-supported residency “designed to help artists envision future scenarios related to the topic of Food as Medicine [and] to improve people’s and the planet’s well-being” (<https://musae.starts.eu/>). In the same time frame, the European Commission (EC) decided to renew the use of the herbicide Glyphosate in the EU for an additional 10 years.

Glyphosate—previously sold as the product RoundUp®—is commonly sprayed on farms worldwide. It has been classified as “causing serious eye damage and being toxic to aquatic life”, but because the substance could not specifically be classified as a carcinogen with the existing scientific evidence, it has been approved for use through December 15, 2033. Glyphosate is a chemical herbicide. It is a biocide specifically designed to kill life and reduce biodiversity.

In response to the surprising ruling by the EC, we were motivated to directly address the ongoing destruction of terrestrial and aquatic biodiversity caused by Glyphosate. This zine, **GLYPHOTAINED**, takes a citizen-science approach, and presents methods for testing and reducing exposure to foods that have been sprayed with the herbicide Glyphosate.

It promotes the belief that healthy food systems can be built using regenerative principles, instead of chemical inputs, and that emerging technologies can be designed and deployed for this purpose. GLYPHOTAINTED is shaped by our studio's mission to map food controversies, prototype alternative culinary futures and imagine a more just, biodiverse and beautiful food system.



The screenshot shows the European Commission website. At the top left is the European Commission logo. To the right, there is a language selector set to 'English'. Below the logo, the navigation menu includes 'Food, Farming, Fisheries' and 'Food Safety'. The 'Food Safety' section has a sub-menu with 'Home', 'Food', 'Animals', 'Plants', and 'Horizontal topics'. The breadcrumb trail reads: 'Home > Plants > Pesticides > Approval of active substances > Renewal of approval > Glyphosate'. The main heading is 'Glyphosate'. Underneath, there is a 'Latest' section with three paragraphs of text. The first paragraph discusses a vote on October 13, 2023. The second paragraph discusses an appeal committee meeting on November 16, 2023. The third paragraph discusses the adoption of an implementing regulation on November 28, 2023. Below this is a link to 'Q&A on the renewal of approval'. The next section is 'Status of glyphosate in the EU', stating it is currently approved until December 15, 2033. This is followed by a paragraph explaining that glyphosate can be used in Plant Protection Products (PPPs) subject to national authorization. The next section is 'Renewal process', which describes the application submitted by the Glyphosate Renewal Group and checked by the AGG, and notes that the application was published on EFSA's website. The final paragraph states that supplementary dossiers were submitted on June 8, 2020.

European Commission

English

Food, Farming, Fisheries

Food Safety

Home Food Animals Plants Horizontal topics

Home > Plants > Pesticides > Approval of active substances > Renewal of approval > Glyphosate

Glyphosate

Latest

On 13 October 2023, Member States voted on the draft Regulation put forward by the Commission (see below for the final texts on which Member States voted). The Committee did not deliver an opinion on this proposal (i.e. there was no qualified majority either in favour or against). Please see [a summary of the discussion](#).

The Commission referred the Regulation to the Appeal Committee which met on 16 November 2023. The Appeal Committee did not deliver an opinion (i.e. there was no qualified majority either in favour or against the Commission's proposal). Please see [a summary of the discussion](#).

On 28 November 2023, the European Commission adopted the Implementing Regulation to renew for 10 years, the approval of glyphosate. This is in line with the EU's legislation which obliges the Commission to adopt an Implementing Regulation when no qualified majority, either in favor or against, is reached in the Standing Committee and in the Appeal Committee, as in the case of glyphosate. The [Implementing Regulation](#) was published in the Official Journal of the EU on 29 November 2023.

Further information can be found in the following [Q&A on the renewal of approval](#).

Status of glyphosate in the EU

Glyphosate is [currently approved](#) in the EU until 15 December 2033

Therefore, glyphosate can be used as an active substance in Plant Protection Products (PPPs), until that date, subject to each PPP being authorised by national authorities following an evaluation of its safety.

Renewal process

An application was submitted by the Glyphosate Renewal Group and then checked by the AGG to ensure it fulfilled the requirements of the applicable EU legislation ([Commission Implementing Regulation \(EU\) No 844/2012 on the renewal procedure for active substances](#)).

The application was published on EFSA's website.

The supplementary dossiers containing the required set of scientific studies and literature data were submitted by the Glyphosate Renewal Group on 8 June 2020 (before the deadline of 15 June 2020).

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Glyphosate: no critical areas of concern; data gaps identified

Published: 6 July 2023 | 4 minutes read

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The assessment of the impact of glyphosate on the health of humans, animals and the environment did not identify critical areas of concern. Some data gaps are reported in EFSA's conclusions - as issues that could not be finalised or outstanding issues – for the European Commission and Member States to consider in the next stage of the renewal of approval process. These are the main findings of EFSA's peer review of the *risk assessment* of glyphosate, carried out by authorities in four Member States (acting jointly as "Rapporteur Member States").



Editorial credit: Leitenberger Photography / Shutterstock.com

EFSA did not identify any critical areas of concern in its peer review of the risk assessment of the active substance glyphosate in relation to the risk it poses to humans and animals or the environment. A concern is defined as critical when it affects *all* proposed uses of the active substance under evaluation (e.g. pre-sowing uses, post-harvest uses etc.), thus preventing its approval or renewal.

URL: https://food.ec.europa.eu/document/download/68ff0696-9259-4a6d-90bf-cbc14a9f76c5_en?filename=pesticides_renew_glyphosate_cso-to-comm_statement_20230907.pdf



Ms. Stella Kyriakides
European Commissioner for Health and Consumer Policy
European Commission
B-1049 Brussels - Belgium

September 7th, 2023

Subject: Stop the reappraisal of glyphosate due to major deficiencies in carcinogenicity assessment

Dear Commissioner Kyriakides,

We, the undersigned 15 European civil society organisations, are writing to you to express our concerns regarding the Commission's intention to present a renewal regulation proposal for glyphosate at the SCoPAFF meeting on the 15th of September and invite the Member States to vote at the meeting in October. In this letter we centre our concerns around the equivocal claims in the EU carcinogenicity assessment regarding the observed tumour incidences in glyphosate-exposed animals, two missing genotoxicity OECD studies and -as highlighted in a [recent publication](#)- important mechanistic evidence indicating that glyphosate induces oxidative stress, a recognised mechanism that can lead to cancer. These issues were neglected by ECHA leading to the flawed opinion that glyphosate is unlikely to be a presumed human carcinogen, an opinion unfortunately endorsed by EFSA¹ and serving as the basis for the Commission's forthcoming renewal proposal.

At the beginning of the re-assessment of glyphosate, NGOs and independent scientists alerted about important incoherences in the EU scientific evaluation of glyphosate's genotoxicity and carcinogenicity potential². Three independent scientists who participated in the discussions of ECHA's Risk Assessment Committee (RAC), provided evidence supporting the classification of glyphosate as a presumed carcinogen and as genotoxic based on OECD cancer studies and

¹ <https://doi.org/10.2903/j.efsa.2023.8164>

² <https://www.env-health.org/health-and-environmental-groups-raise-alarms-over-eu-chemicals-agencys-failure-to-classify-glyphosate-as-a-carcinogen-for-human-health/> <https://www.env-health.org/wp-content/uploads/2022/06/HEAL-How-the-EU-risks-greenlighting-a-pesticide-linked-to-cancer-2022.pdf>

URL: <https://www.google.com/url?q=https://academic.oup.com/toxsci/article-pdf/192/2/131/49999849/kfad018.pdf&sa=D&source=docs&ust=1712577075572539&usg=AOvVawOdZ3SiTjbvqxL6TgUzRKNz>

Glyphosate toxicity: in vivo, in vitro, and epidemiological evidence

Rachel Lacroix^{1,2,3} Deborah M. Kurrasch^{1,2,4*}

¹Department of Medical Genetics, Cumming School of Medicine, University of Calgary, Calgary, AB T2N 4N1, Canada

²Alberta Children's Hospital Research Institute (ACHRI), Calgary, AB T2N 4N1, Canada

³Neuroscience Brain Institute, University of Calgary, Calgary, AB T2N 4N1, Canada

*To whom correspondence should be addressed. E-mail: kurrasch@ucalgary.ca

Abstract

Glyphosate is the most applied agricultural chemical worldwide and has become nearly ubiquitous throughout the environment. Glyphosate is an effective herbicide because it disrupts the shikimate pathway, which is responsible for the synthesis of essential amino acids in plants and microorganisms. Given that there is no known target for glyphosate in higher animals, its toxicity to humans and other animals is heavily debated, especially after the 2015 IARC ruling that glyphosate is carcinogenic. Today, a growing body of literature shows in vitro, in vivo, and epidemiological evidence for the toxicity of glyphosate across animal species. With the application of glyphosate increasing globally, it is important to discuss these reports to enable a broader conversation on glyphosate toxicity and its impact on human and environmental health. Here, we summarize the recent glyphosate literature and discuss its implications.

Keywords: glyphosate, glyphosate-based herbicides, agriculture, adverse effects, environmental chemicals

Introduction

N-(phosphonomethyl)glycine (glyphosate; Figure 1) is the active ingredient in glyphosate-based herbicides (GBHs), which is the most used herbicide globally. Indeed, approximately 280 million pounds are applied annually in the United States alone (EPA, 2019). First discovered by a Monsanto scientist, glyphosate was initially under patent as RoundUp (Monsanto), a broad-spectrum GBH containing glyphosate as the active ingredient in a mixture with water and unknown inert adjuvants. GBHs were quickly adopted into agricultural practices due to their perceived low toxicity to animals since glyphosate inhibits weed growth by targeting the plant-specific shikimate pathway (Steinrücken and Amrhein, 1980). Specifically, glyphosate inhibits 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS), an enzyme unique to plants and microorganisms (Amrhein et al., 1980; Kishimoto and Shah, 1988; Steinrücken and Amrhein, 1980), leading to assumptions that this chemical would be safe in animals (including humans) since they lack this enzyme. EPSPS is critical for the synthesis of the essential aromatic amino acids tryptophan, phenylalanine, and tyrosine, and further secondary metabolites (Herzmans and Weaver, 1989), as such making glyphosate a particularly effective herbicide.

History and commercialization of glyphosate

Chemist Dr. Henri Martin invented glyphosate in 1950, but its herbicidal importance was not fully realized until the 1970s, when Monsanto patented the glyphosate mixture RoundUp (Monsanto, Dill et al., 2010). Monsanto monopolized the glyphosate market until 2000, when their original patent expired

Because then, other companies have capitalized on glyphosate's effectiveness and now over 750 glyphosate-based products are sold in the United States alone (Menderson et al., 2010). Many of these products, like RoundUp, are proprietary formulations. These mixtures contain glyphosate as the active ingredient, most often in isopropyl ammonium salt form, to constitute 40%–60% of most GBH products (EPA, 2015a,b), with inert ingredients such as water, heavy metals (ie, arsenic, cobalt), and a proprietary mixture of surfactants, commonly of the polyoxyethyleneamine (POEA) family (DeLorge et al., 2018), comprising the remaining volume.

Cumulative global use of glyphosate in the last decade alone is estimated to represent over 70% of total glyphosate volume applied since its commercialization nearly 50 years ago (Bentzen et al., 2016; Duke and Powles, 2008). After bringing glyphosate to the market, Monsanto continued to dominate the market by developing RoundUp Ready (Monsanto) seeds with in-weed glyphosate tolerance. These genetically modified (GM) crops are thought to be cost-effective and environmentally friendly by decreasing herbicide use whilst increasing crop yield (Phipps and Park, 2002). However, rapid adoption of glyphosate for use on these GM crop varieties has led to several weed species developing glyphosate-resistance. Today, 55 plant species have developed this resistance, a number steadily increasing since the introduction of RoundUp Ready soybeans in 1996 (Heap, 2022).

Environmental prevalence of glyphosate

The annual application volume of glyphosate globally is 600 000–750 000 tonnes, which is estimated to increase to 740 000–920 000 tonnes annually by 2025 (Maggi et al., 2020). With increasing

WHY TEST? GROUND TRUTH

Ground truth means getting as close as possible to the thing you are interested in knowing more about, and relying on physical experiences rather than secondary research or knowing at a distance. In this case we wanted to test actual samples for trace amounts of Glyphosate.

How can we view the chemicals that we are applying in the fields and that are seeping into the ground, food and waterways? Doing ground truth about Glyphosate requires physically assembling material from the food system, and using chemistry to analyze what is there.

ABRAXIS® Glyphosate Strip Test

500098/500095

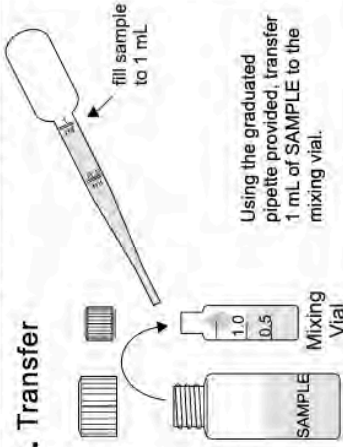
GOLD
STANDARD
DIAGNOSTICS

1. Collect Sample/Extract



Collect sample
or extract.

2. Transfer



fill sample
to 1 mL

Using the graduated
pipette provided, transfer
1 mL of SAMPLE to the
mixing vial.

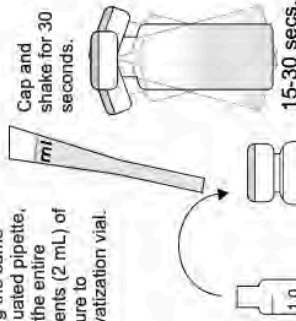
3. Mix



Mix for 30
seconds.

4. Add Mixture to Derivatization Vial

Using the same
graduated pipette,
add the entire
contents (2 mL) of
mixture to
derivatization vial.



Cap and
shakes for 30
seconds.

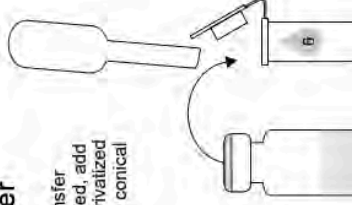
Incubate for
10 min.

15-30 secs.

10 min.

5. Transfer

Using the transfer
pipette provided, add
6 drops of derivatized
sample to the conical
flip-top tube.



6. Shake and incubate



Close the conical flip-
top tube and shake for
30 seconds. Check
tube to ensure dried
reagent dissolves
completely (will turn
the sample purple).

Incubate for 10 minutes.



Mixing Vial



Derivatization Vial



(The Derivatization Vial contains a small amount of liquid reagent.)



Derivatized Sample

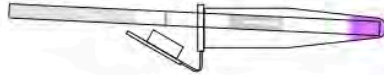


(The conical flip-top tube contains dried reagents.)



7. Test

Insert test strip into conical flip-top tube with arrow pointing down (sample pad down).



Incubate for 10 minutes.

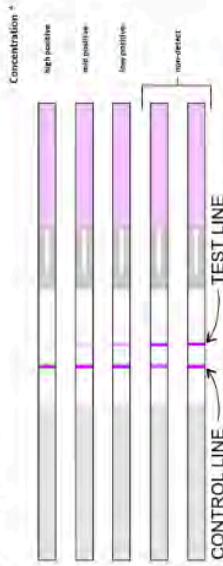


8. Dry

Remove test strip. Lay flat and allow to continue developing for 10 minutes.



9. Interpret



INTERPRET TEST

CONTROL LINE	TEST LINE	INTERPRETATION
NO CONTROL LINE PRESENT	NO TEST LINE PRESENT	INVALID RESULT
CONTROL LINE PRESENT	VERY FAINT TEST LINE OR NO TEST LINE PRESENT	HIGH CONCENTRATION
CONTROL LINE PRESENT	MODERATE INTENSITY TEST LINE PRESENT	LOW TO MODERATE CONCENTRATION

*See appropriate technical bulletin for actual sample concentration ranges in various matrices.

Gold Standard Diagnostics
124 Railroad Drive
Warminster, PA 18974
WEB: www.abraxiskits.com

Date this Flow Chart is effective: 03/FEB/2022

T (215) 357 3811
F (215) 357 5232

Ordering: info.abraxiskits@us.goldstandarddiagnostics.com
Technical Support: support.abraxiskits@us.goldstandarddiagnostics.com

Version: 01



ABRAXIS® Glyphosate Strip Test

Immunochromatographic Strip Test for the Detection of Glyphosate in Water and Food Samples

Product No. 500098 (5 Test), 500095 (20 Test)

1. General Description

The ABRAXIS® Glyphosate Strip Test is a rapid immunochromatographic test designed solely for use in the qualitative screening of Glyphosate in water and food samples. For food samples such as honey, lentils, baby food, wheat/oat cereal, a sample extraction is necessary. For these and other matrices of interest, please contact ABRAXIS® for the appropriate technical bulletin and/or matrix validation guidelines. The ABRAXIS® Glyphosate Strip Test provides only preliminary qualitative test results. If necessary, positive samples can be confirmed by ELISA, HPLC, or other conventional methods.

2. Safety Instructions

Consult state, local, and federal regulations for the proper disposal of all reagents. All samples and reagents used in this test are not for consumption. Please do not eat or drink samples during preparation, testing, or after contact with any reagents.

3. Storage and Stability

The ABRAXIS® Glyphosate Strip Kit should be stored between 2-30°C. The test strips, vials, assay buffer, and samples to be analyzed should be at room temperature before use. Reagents may be used until the last day of the month as indicated by the expiration date on the box.

4. Test Principle

The test is based on the recognition of Glyphosate by specific antibodies. The sample to be tested is derivatized and then added to the conical test vial containing specific antibodies for Glyphosate labeled with a gold colloid. The Glyphosate conjugate on the membrane strip competes for antibody binding sites with the Glyphosate that may be present in the sample. A control line, produced by a different antibody/antigen reaction, is also present on the membrane strip. The control line is not influenced by the presence or absence of Glyphosate in the sample and, therefore, should be present in all reactions.

In the absence of Glyphosate in the sample, the colloidal gold labeled antibody complex moves with the sample by capillary action to react with the immobilized Glyphosate conjugate. An antibody-antigen reaction occurs forming a visible line in the "test" area. The formation of two visible lines of similar intensity indicates a negative test result, meaning the test did not detect Glyphosate at or below the established cut-off point for the test. If the Glyphosate is present in the sample, it competes with the immobilized Glyphosate conjugate in the test area for the antibody binding sites on the colloidal gold labeled complex. If a sufficient amount of Glyphosate is present, it will fill all of the available binding sites, thus preventing attachment of the labeled antibody to the Glyphosate conjugate, therefore preventing the development of a colored line. If a colored line is not visible in the test line region, or if the test line is lighter than the control line, Glyphosate is present at a detectable level (>0.5 ppb). Semi-quantitative results can be obtained by comparing the sample test strip appearance to the appearance of test strips from solutions of known Glyphosate concentrations (control solutions). ABRAXIS® Control Solution - Mid Detection Range (PN 500102) are available from Gold Standard Diagnostics.

5. Limitations of the ABRAXIS® Glyphosate Strip Test, Possible Test Interference

Numerous organic and inorganic compounds commonly found in samples have been tested and found not to interfere with this test. However, due to the high variability of compounds that might be found in samples, test interferences caused by matrix effects cannot be completely excluded.

Mistakes in handling the test can also cause errors. Possible sources for such errors include: Inadequate storage conditions of the test strip, too long or too short incubation times, and extreme temperatures during the test performance (lower than 10°C or higher than 30°C).

This test is designed for use with water and food samples. The ABRAXIS® Glyphosate Strip Test provides only a preliminary qualitative test result. Use another more quantitative analytical method such as ELISA or instrumental analysis to obtain a confirmed quantitative analytical result. Apply good judgement to any test result, particularly when preliminary positive results are observed.

6. Warnings and Precautions

- The ABRAXIS® Glyphosate Strip Test is for the screening of water and food samples (see Section C, Sample Collection and Handling).
- The test strips, vials, and samples should be allowed to reach room temperature before testing.
- Prior to use, ensure that the product has not expired by verifying that the date of use is prior to the expiration date on the label.
- Test strips and conical tubes should be kept sealed in their original packaging with desiccant when not in use. Exposure to humidity during storage may adversely impact their performance and give inaccurate results. After initial use in high humidity conditions remaining kit components should be stored tightly closed with desiccant and refrigerated (2 – 8 °C) when not in use.
- Avoid cross-contamination of samples by using a new sample vial and disposable pipette for each sample.
- Use only the test strips, mixing vials, derivatization vials, and conical vials from one kit lot (do not mix with other lots), as they have been adjusted in combination.
- Use reasonable judgement when interpreting the test results.
- Results should be interpreted within 5-10 minutes after completion of the test.

A. Reagents and Materials Provided

1. Glyphosate test strips in a desiccated container
2. Derivatization vials - contain a small amount of liquid reagent
3. Conical test vials
4. Disposable transfer pipettes
5. Disposable graduated pipettes
6. Self-standing, 2.0 mL mixing vials - contain 1.0 mL ABRAXIS® Glyphosate Assay Buffer
7. User's guide and flow chart

B. Additional Materials (not provided with the test kit)

1. Timer
2. Marking pen
3. Container/storage vials or bottles for sample collection/preparation

C. Sample Collection and Handling

Water Samples

Water samples should be collected in clean glass or plastic sample containers. Chlorinated drinking water samples should be tested immediately upon collection, as contact with chlorine will degrade Glyphosate, producing biased low results.

Food Samples

Food samples must undergo appropriate sample preparation procedures prior to analysis to obtain accurate results. Please contact Gold Standard Diagnostics for additional information regarding sample preparation (extraction) for various food matrices.

Store samples refrigerated for up to 1 week. For storage periods greater than 1 week, samples should be stored frozen.

D. Controls

It is a good laboratory practice to use positive and negative controls to ensure proper test performance. Samples containing known quantities of Glyphosate (positive controls) and samples known to be free of Glyphosate (negative controls) should be analyzed with each lot of test strips to provide a reference for line intensities to be expected. ABRAXIS® Control Solution - Mid Detection Range (PN 500102) can be purchased from Gold Standard Diagnostics.

E. Test Preparation

1. Allow test strips, vials, and samples to reach room temperature before use.
2. Remove the number of test strips required from the package. The remaining strips are stored in the tightly closed desiccated container.
3. Samples must be derivatized prior to each analysis (refer to Section F Testing of Samples). Failure to derivatize samples will cause inaccurate results.

F. Testing of Samples

1. Label Mixing Vials, Derivatization Vials, Conical Test Vials, and disposable graduated pipettes (to be

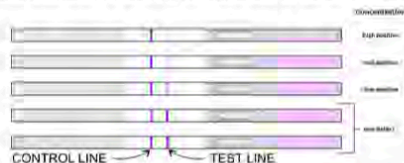
- used for steps 2 and 4) provided in the kit for each sample to be tested
- Using the appropriate **disposable graduated pipette** for each sample, draw up the sample to the 1.0 mL mark of the pipette and dispense the entire 1.0 mL in the appropriately labeled 2.0 mL mixing vial containing 1.0 mL ABRAXIS® Glyphosate Assay Buffer.
 - Cap the vial and mix well by shaking for 30 seconds. Using the **same graduated pipette** previously used for the sample, remove the entire contents (2.0mL) of sample mixture and transfer to the appropriately labeled derivatization vial. Mix by shaking for 30 seconds. Incubate for 10 minutes at room temperature to complete the sample derivatization.
 - Using a **new disposable transfer pipette** for each sample, transfer 6 drops (approximately 0.2 mL) of the derivatized sample to the appropriately labeled conical test vial.
 - Close the conical test vial and shake for 30 seconds. Examine the vial to **ensure all dried reagents are completely dissolved** (dried reagents will dissolve, turning the sample purple).
 - Incubate the conical test vial for 10 minutes at room temperature.
 - Insert test strip (arrows down) into the conical vial.
 - Allow the test to develop for 10 minutes at room temperature.
 - At the 10 minute mark, remove the test strip. Lay the strip flat and allow to continue developing for 10 minutes at room temperature.
 - Immediately** read the results visually, as explained below in Section G, Interpretation of Results.

G. Interpretation of Results

Sample concentrations are determined by comparison of the intensity of the test line to the intensity of the control line on the same test strip. Although control line intensity may vary, a visible control line must be present for results to be considered valid. Test strips with a test line which is darker than or of equal intensity to the control line indicates a result which is below the limit of detection of the test. Test strips with a test line which is lighter than the control line indicates a low to moderate concentration result. Test strips with a very faint test line or no test line visible indicates a high concentration result. Please see the appropriate technical bulletin for the actual sample concentration ranges in various matrices. Results should be determined within 5-10 minutes after completion of the strip test procedure. Determination made using strips which have dried for more or less than the required time may be inaccurate, as line intensities may vary with drying time.

<u>Control Line</u>	<u>Test Line</u>	<u>Interpretation</u>
No control line present	No test line present	Invalid result
Control line present	Very faint or no test line present	High concentration
Control line present	Moderate intensity test line present	Low to moderate concentration

The appearance of test strips may also be compared to the illustration below to determine approximate sample concentration ranges. Please note that the illustration is intended for the demonstration of test line to control line intensity only. Results should not be determined by comparing the intensity of test lines from test strips to the test line intensity of the illustration, as the overall intensity of test strips may vary slightly with different lots of reagents. To obtain semi-quantitative results, solutions of known Glyphosate concentration (control solutions) must be tested concurrently with samples. Sample test line intensities can then be compared with control solution test line intensities, yielding approximate sample concentrations. Do not use strips run previously to determine semi-quantitative sample concentrations, as test line intensities may vary once strips are completely dry.



Alternately, test strips can also be interpreted using the AbraScan test strip reader (PN 475025), which provides objective determination of line intensities for consistent interpretation of results as well as a digital photographic record of all test strips or with the RapidScan test strip reader (PN 475035 with strip cassette 475032).

H. Additional Analysis

If necessary, positive samples can be confirmed by ELISA, HPLC, or other conventional methods.

Importance of Glyphosate Determination

Glyphosate, a broad-spectrum systemic herbicide, was introduced in 1974 by Monsanto under the trade name Roundup®. Glyphosate (N-(phosphonomethyl) glycine or 2-[(hydroxy-oxidophosphoryl)methylamino] acetic acid) is the largest selling agrochemical in the world and is marketed under dozens of trade names by many different manufacturers. Glyphosate is used for vegetation control of perennial and annual plants, broad-leaf weeds, grasses, woody plants, and aquatic weeds, as well as grain desiccation to increase harvest yield. The introduction of genetically modified crops resistant to Glyphosate (i.e. Roundup Ready®) has caused an increased use of Glyphosate, allowing farmers to control weeds without harming their crops. The emergence of Glyphosate-resistant weeds has also caused increases in frequency and quantity of applications of Glyphosate in combination with other herbicides. Due to its widespread use, Glyphosate has become ubiquitous in the environment and food supply.

Glyphosate can adsorb to soil and is highly water soluble, which can cause surface and ground water contamination from run-off, soil erosion, and leaching especially after heavy rainfall. The long-term impact on the environment and human health are growing concerns worldwide. In March 2015, the World Health Organization's International Agency for Research on Cancer classified Glyphosate as "probably carcinogenic in humans" (category 2A). Some studies show a correlation between exposure to Glyphosate-based herbicides and non-Hodgkin's Lymphoma in humans while others show evidence of Glyphosate causing cancers in laboratory animals.

Performance Data

Test sensitivity: The ABRAXIS® Glyphosate Strip Test will detect Glyphosate in water samples in the range of 0.5 ppb to 20 ppb. At this level, the test line exhibits moderate intensity. At levels greater than 20 ppb, the test line is very faint or not visible. Please see the appropriate technical bulletin for sensitivity in additional sample types.

Samples: A sample correlation between the ABRAXIS® Strip Test and ELISA methods showed a good correlation.

References

- 1) US patent 3799758, Franz JE, N-phosphonomethyl-glycine phytotoxicant compositions, issued 1974-03-26, assigned to Monsanto Company.
- 2) Steinrucken HC, Amrhein N (Jun 1980). The herbicide glyphosate is a potent inhibitor of 5-enolpyruvylshikimic acid-3-phosphate synthase. Biochemical and Biophysical Research Communications. 94 (4):1207-12.
- 3) Press release: IARC Monographs Volume 112: Evaluation of five organophosphate insecticides and herbicides. International Agency for Research on Cancer, World Health Organization. March 20, 2015.
- 4) Glyphosate: EPSA updates toxicological profile, European Food Safety Authority. www.efsa.europa.eu. Retrieved 2016-05-23.

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For ordering or technical assistance contact:

Gold Standard Diagnostics

124 Railroad Drive

Warminster, PA 18974


WEB: www.abraxiskits.com

Tel.: (215) 357-3911

Fax: (215) 357-5232

Ordering: info.abraxis@us.goldstandarddiagnostics.com

Technical Support: support.abraxis@us.goldstandarddiagnostics.com

URL: <https://www.goldstandarddiagnostics.us/home/resources/technical-bulletins/glyphosate/>

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Home > Resources > Technical Bulletins > Glyphosate

Glyphosate

We have developed technical bulletins to support our test kits across a variety of sample matrices. These are our current technical bulletins available by product/analyte and testing format.

- TB 22-001 (REV 01) Glyphosate in Avocados ELISA
- TB 22-002 (REV 01) Glyphosate in Beer ELISA
- TB 22-003 (REV 01) Glyphosate in Bread and Pasta ELISA
- TB 22-004 (REV 01) Glyphosate in Raw Buckwheat Groats Extraction ELISA
- TB 22-005 (REV 01) Glyphosate in Cereal ELISA
- TB 22-006 (REV 01) Glyphosate in Chips ELISA
- TB 22-007 (REV 01) Glyphosate in Durum Wheat Extraction ELISA
- TB 22-008 (REV 01) Glyphosate in Gelatin ELISA
- TB 22-009 (REV 01) Glyphosate in Grapes ELISA
- TB 22-010 (REV 01) Glyphosate in Green Coffee Bean Extraction ELISA
- TB 22-011 (REV 01) Glyphosate in Ground Oats, Wheat, and Barley ELISA

- TB 22-029 (REV 01) Glyphosate in Wine and Grape Juice ELISA
- TB 22-030 (REV 01) Glyphosate in Yellow Peas Red Lentils Extraction ELISA
- TB 21-017 (REV 01) Glyphosate Green Coffee Grinding Bulletin
- TB 21-001 (REV 10) Glyphosate Interpretation Reference Guide Technical Bulletin
- TB 21-002 (REV 01) Glyphosate in Water Strip Test Technical Bulletin
- TB 21-003 (REV 01) Glyphosate in Honey Strip Test Technical Bulletin
- TB 21-005 (REV 05) Glyphosate in Corn Soybeans Dry Pasta Durum Wheat Barley Whole O Groats Strip
- TB 21-006 (REV 02) Glyphosate in Raw Buckwheat Groats for Strip Test Technical Bulletin
- TB 21-007 (REV 01) Glyphosate in Lentils Strip Test Technical Bulletin
- TB 21-015 (REV 01) Glyphosate in Granulated Sugar Strip Test
- TB 21-016 (REV 01) Glyphosate in Green Coffee Strip Test
- TB 21-017 (REV 01) Glyphosate Green Coffee Grinding Bulletin
- TB 21-018 (REV 01) Glyphosate in White Bean Strip Test
- TB 22-021 (REV 01) Glyphosate in Beer Strip Test
- TB 22-035 (REV 01) Glyphosate in Eggs Strip Test

Avocados
Beer
Bread and Pasta
Cereal
Chips
Corn Soybeans Dry Pasta
Durum Wheat
Eggs
Gelatin
Granulated Sugar
Grapes
Green Coffee
Green Coffee Bean
Ground Oats, Wheat, and Barley
Honey
Honey-Corn Syrup
Legumes, Grains, and Seeds
Lentils
Milk
Plant-Based Cooking Oils
Potatoes
Pureed Baby Food
Raw Buckwheat Groats
Rose Stems
Soy Sauce
Tea
Tofu
White Bean
White Granulated Sugar
Wine and Grape Juice
Yellow Peas and Red Lentils



WHY BEER?

We spent the month before the exhibition attempting to find commercially-available tests for glyphosate. Many of the labs either needed long lead times to send out test kits, or required users to mail in samples, or provide credentials. At the last minute, one provider kindly scrounged a 5-pack of almost expired tests, and was excited to hear we were doing citizen science.

We looked through the scientific protocols of how to use the Glyphosate Strip test, and beer and water were the only samples that were easy to process without lab equipment (like a centrifuge).

This is only the first time we have used these kinds of tests, but they could be interesting for future DIY-Bio / Citizen science work.



Can we compose a recipe—or even an entire cuisine—that minimizes our exposure to Glyphosate? Where to begin?

As an initial exploration of creating a GLYPHOSAFE recipe on our visit to Barcelona, we took the list of ingredients that are testable and excluded them from our recipes. We'll have to test each of them to be sure the Glyphosate levels are zero (or too small to be detected by a test). Until we can run all of those tests, what other ingredients can we safely exclude?

As an added bonus we are going to exclude any animal products, both because their feedstocks are often sprayed with Glyphosate, but also because we should be eating less animal products due to other environmental burdens. However, this left us with the challenge of excluding both “Plant-Based Cooking Oils” and “Butter”, so we opted for a nut oil.

Next we identified an iconic dish available in Barcelona (Tortilla) and attempted to make it “Glyphosafe” using CHAT GPT4 as our handy recipe generator.

Glyphosate(r) Tortilla

User: Can you make a recipe for Spanish Tortilla using turnips instead of potatoes, a vegan egg-substitute made from chickpeas, and cooked in walnut oil?

ChatGPT 4: Certainly!

A Spanish Tortilla, traditionally made with potatoes and eggs, can be transformed into a delightful vegan and turnip-based version with the adjustments you've suggested. Here's how you can make a Spanish Tortilla using turnips, a vegan egg substitute from chickpeas (often referred to as "chickpea flour omelette mix" or "vegan chickpea egg"), and cooking it in walnut oil for a unique twist.

Vegan Spanish Tortilla with Turnips

Note: Where possible purchase bio products.

Ingredients:

- 2 medium turnips, peeled and thinly sliced
- 1 cup chickpea flour (also known as gram flour or besan)
- 1 1/4 cups water
- 1/4 cup walnut oil, plus more as needed for frying
- 1 medium onion, thinly sliced
- Salt and black pepper, to taste
- 1/2 teaspoon turmeric powder, for color (optional)
- 1/4 teaspoon kala namak (black salt, optional for an eggy flavor)
- Fresh herbs (such as parsley or chives) for garnish, chopped

Instructions:

1. Prepare the Vegan Egg Mixture:

- In a bowl, whisk together the chickpea flour, water, turmeric (if using), and kala namak (if using) until smooth. This mixture will mimic the egg base of a traditional tortilla. Let it sit for a few minutes so the flour can absorb the water and thicken slightly.

2. Cook the Turnips and Onion:

- Heat half of the walnut oil in a non-stick frying pan over medium heat. Add the sliced onions and turnips, season with salt and pepper, and cook, stirring occasionally, until both are tender and the onions are slightly caramelized. This may take about 10-15 minutes. Adjust the heat as needed to prevent burning.

3. Combine with Vegan Egg:

- Once the turnips and onions are cooked, reduce the heat to low and spread them out evenly in the pan. Pour the chickpea flour mixture over the turnips and onions, ensuring the mixture spreads out evenly and covers the vegetables.

4. Cook the Tortilla:

- Cover the pan and let the tortilla cook on a low heat for about 10 minutes, or until the edges start to pull away from the pan and the

bottom is golden brown. To flip the tortilla, place a large plate over the pan, carefully turn the pan over so the tortilla transfers to the plate, then slide the tortilla back into the pan to cook the other side. Add a bit more walnut oil if the pan seems too dry.

5. Finish Cooking:

- Cook for another 5-8 minutes until the other side is also golden brown and the tortilla is firm to the touch.

6. Serve:

- Let the tortilla cool for a few minutes before slicing. Garnish with fresh herbs, slice, and serve warm or at room temperature.

This vegan Spanish Tortilla keeps the essence of the traditional dish while introducing new flavors and textures with the turnips and walnut oil. It's a creative and delicious twist that can be enjoyed by everyone, regardless of dietary preferences.

NOTES: Vegan Tortilla (using chick peas / garbanzo beans) is already readily available both in some restaurants and at large supermarket chains such as Carrefour. Also, during post-war food crisis some people attempted to make some versions of their favorite recipes. One Tortilla recipe can be found here: Tortilla sin huevo y "arroz por cojones": la gastronomía hambrienta de posguerra (https://elpais.com/gastronomia/el-comidista/2021/10/07/articulo/1633603639_999507.html#)

COLOPHON

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