

# FOREST - OUR LIFELONG TEACHER

ERASMUS+ PROJECT

INTERNATIONAL ON-LINE CONFERENCE

## *FOREST RELATED ACTIVITIES*

May 29/30/31 2023



Co-funded by  
the European Union



AMBASADORI ODRŽIVOG  
RAZVOJA I ŽIVOTNE SREDINE  
ENVIRONMENTAL AMBASSADORS  
FOR SUSTAINABLE DEVELOPMENT



**THE GLOBE PROGRAM**

*European Phenology Campaign*

# ***Fenološko praćenje stabala***

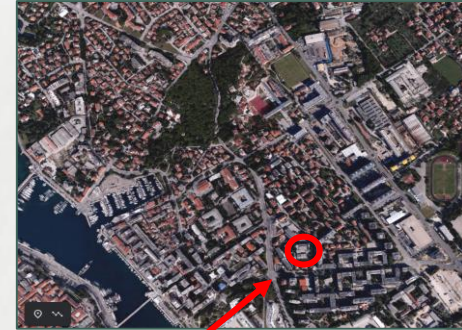
Anita Mustać, dipl. ing. biologije  
OŠ Šime Budinića Zadar  
Croatia

Osnovna škola  
Šime Budinića Zadar  
Hrvatska





# Google Earth



GPS koordinate:

N 44.117294

E 15.236458

Osnovna škola  
Šime Budinića Zadar  
Hrvatska

# GLOBE tim za praćenje fenologije



Anita Mustać, prof. biologije  
Zrinka Klarin, prof. geografije  
Učenci 6.c i 6.d razreda



# Fenologija



Listanje jorgovana



Cvjetanje jorgovana

- ❖ Znanost koja proučava izmjene bioloških ciklusa i njihovu povezanost s klimom.
- ❖ kod životinja: godišnje migracije ptica, izlaz kukaca iz jaja, mrijest riba...
- ❖ kod biljaka: listanje, cvjetanje...
- ❖ redovito lokalno praćenje bioloških ciklusa biljaka pokazuje kako vegetacija odgovara na promjenu klime
- ❖ važan doprinos za praćenje promjena na globalnoj razini



## THE GLOBE PROGRAM

The Global Learning and Observations to Benefit the Environment

- ❖ Fenologijom se prate promjene na autohtonim (samonikla, lokalna) stablima kao bise usporedile i analizirale satelitske snimke.
- ❖ Stabla ne smiju biti zalijevane i gnojene jer to može izmijeniti njihov fenološki ciklus.
- ❖ Fenološkim promatranjem mogu se pratiti klimatske promjene na globalnoj razini.



# Fenološka promatranja

Green up  
(ozelenjavanje)



Green down  
(promjena boje i  
otpadanje lišća)



Author: Chris Lawton



## **GLOBE PROTOKOLI ZA PUPANJE (OTVARANJE PUPOVA)**

Pupanje je pojava novih listova na biljkama, biljnog organa koji obavlja proces fotosinteze.

### ***Pupanje autohtonog stabla***

- praćenje pupanja autohtone vrste drveća na svom istraživačkom području

### ***Praćenje jorgovana***

- praćenje pupanja i cvatnje običnog jorgovana (*Siringa vulgaris*) koji raste bez zalijevanja





# PROTOKOL ZA PUPANJE



## Green-up

### Tree and Shrub Green-Up Data Sheet

School Name: \_\_\_\_\_ Study Site: \_\_\_\_\_

Observer Names: \_\_\_\_\_

Plant Scientific Name: Genus \_\_\_\_\_ Species: \_\_\_\_\_

Plant Common Name: \_\_\_\_\_

Green-Up Cycle: \_\_\_\_ Year: \_\_\_\_

## ODABIR FENOLOŠKE POSTAJE

1. već određena postaja za istraživanje pokrova
2. nova fenološka postaja (site)
  - mjesto blizu škole ili mjesto pored kojeg učenici svakodnevno prolaze
  - prirodna (autohtona) stabla koja nisu zalijevana ili gnojena
  - utvrditi koordinate postaje
  - blizina meteorološke postaje (podatci o temperaturi i oborinama)
  - odrediti dominantne vrste (rod i vrstu)



# PROTOKOL ZA PUPANJE

## POSTUPAK

- Obavlja se dva puta tjedno (početak praćenja je dva tjedna prije pretpostavljenog datuma otvaranja pupova)
- svakodnevno praćenje nakon početka bubrenja pupova
- pojava otvorenih pupova na tri različite grane





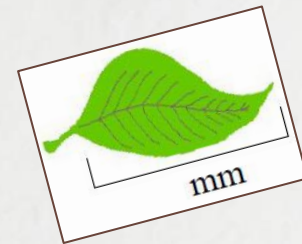
# Green up Ozelenjavanje



**Ozelenjavanje biljke** počinje kada se mirovanje (stanje obustavljenog rasta i metabolizma) prekine zbog okolišnih uvjeta (npr. dulja osunčanost i više temperature).

## **Protokol za listanje**

Prati se vrijeme potrebno za rast lista do pune veličine.



- datum
- praćenje stanja pupova (mirovanje, bubrenje, pupanje, rast ili gubitak lista)
- mjerenje duljine listića na četiri pupa iste grane
- mjerenje prestaje nakon što se dva puta izmjeri ista dužina lista





**Add site type****Atmosphere**

- Atmosphere  
 Surface Temperature

**Hydrosphere**

- Hydrology

**Biosphere**

- Land Cover  
 Greening  
 Phenological Gardens  
 Lillacs  
 Carbon Cycle

**Pedosphere**

- Frost Tube  
 Soil Characterization  
 Soil Moisture and Temperature

**Photos →****Site Name \***

\* indicates a field is required

Školsko dvorište - SMOKVA 2: GRN - 02

Site ID 268228

**Coordinates**

Latitude \*

44.117294 °

Longitude \*

15.236458 °

Elevation \*

0 m

 North  South East  West[Set elevation](#)

Source of Coordinates Data \*

 GPS  Other

## Site Definition

### Add site type

#### Atmosphere

- Atmosphere
- Surface Temperature

#### Hydrosphere

- Hydrology

#### Biosphere

- Land Cover
- Greening
- Phenological Gardens
- Lilacs
- Carbon Cycle

#### Pedosphere

- Frost Tube
- Soil Characterization
- Soil Moisture and Temperature

### Photos →

### Site Name \*

\* indicates a field is required

Skolsko dvoriste SMOKVA:GRN-01

Site ID 32292

### Coordinates

Latitude \*

44.1173 °

North  South

Longitude \*

15.2365 °

East  West

Elevation \*

14 m

[Set elevation](#)

Source of Coordinates Data \*

- GPS
- Other



**POSTAJA ZA PRAĆENJE  
JORGOVANA**  
*(Siringa vulgaris)*



# *Green down*

## *Promjena boje lišća*

**Vegetacijska sezona** je razdoblje između ozelenjavanja i povlačenja zelenila. Promjene u dužini vegetacijskog razdoblja mogu biti pokazatelji globalnih klimatskih promjena.

Promjena boje lista označava kraj vegetacijske sezone (sezone rasta) i prestanak fotosinteze.

Povezana je s klimom.







## PROTOKOL

### ODABIR FENOLOŠKE POSTAJE

1. već određena postaja za istraživanje pokrova
2. nova fenološka postaja (site)
  - mjesto blizu škole ili mjesto pored kojeg učenici svakodnevno prolaze
  - odabir stabla – odrediti rod i vrstu
  - odabir velike i zdrave grane na rubu drveća
  - utvrditi koordinate postaje

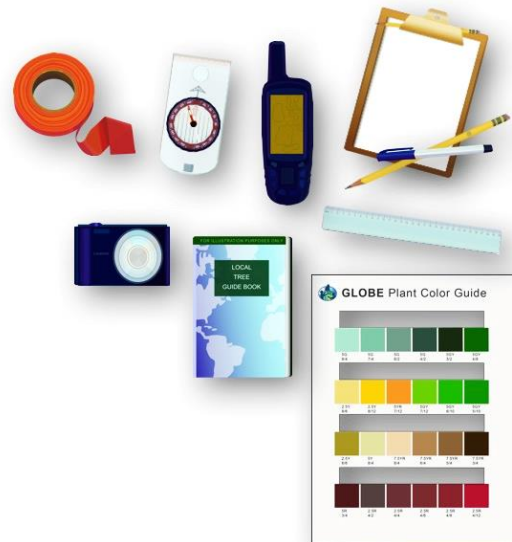
#### Materijal

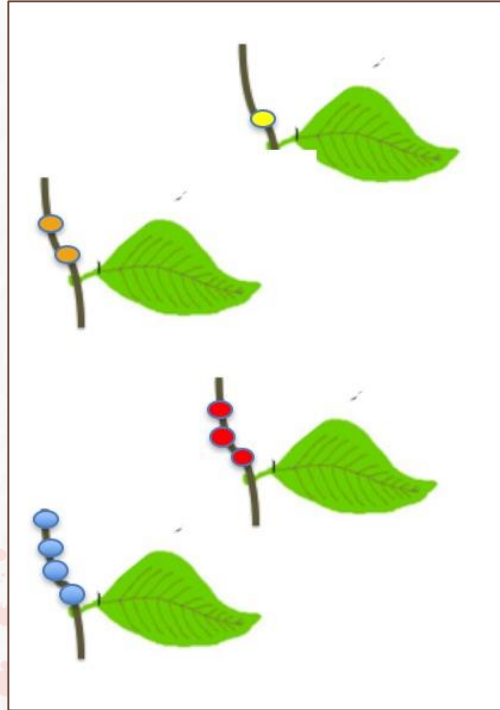
##### Prvi posjet:

- Olovka
- Fotoapararat
- kompas
- flomaster

##### Svaki posjet:

- GLOBE Vodič za boje biljaka
- olovka





- ❖ Odrediti ciklus (1, 2 ili 3).
- ❖ Pronaći list na kraju grane.
- ❖ Markerom označiti list točkom na grani pored stabljike ili peteljke lista.
- ❖ Odrediti ostala tri lista na ovoj grani najbliža završnom listu i označiti ih s dvije, tri ili četiri točke pored njihovih stabljika na grani.
- ❖ Snimiti fotografiju iz središta gledajući u smjeru sjevera, juga, istoka i zapada.



## GLOBE Plant Color Guide

- Usporediti svaki od 4 lista s bojama na GLOBE Vodiču za boje biljaka kako bi procijenili dominantnu boju svakog lista.
- Odrediti obojenost 60 % lista.



# Green-down

## Tree, Shrub, and Grass Green-Down Data Sheet

School Name: \_\_\_\_\_ Study Site: \_\_\_\_\_

Observer Names: \_\_\_\_\_

Plant Scientific Name: Genus \_\_\_\_\_ Species: \_\_\_\_\_

Plant Common Name: \_\_\_\_\_

Green-Up Cycle: \_\_\_\_\_ Year: \_\_\_\_\_

### Tree, Shrub and Grass Green-down

Date (day & month)	Leaf 1 (Color, fallen, or snow covered)	Leaf 2 (Color, fallen, or snow covered)	Leaf 3 (Color, fallen, or snow covered)	Leaf 4 (Color, fallen, or snow covered)	Data entry ✓



School: OS Sime Budinica

Site: Školsko dvorište - SMOKVA 2: GRN - 02



Measurements

Data counts

Information about the school

Site information

Photos

Biosphere

Green-down

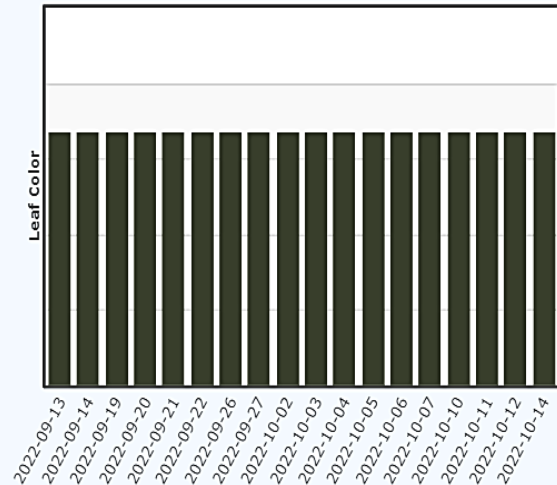
Green-down

Data date range: October 4, 2021 to October 14, 2022.

Plant: Ficus / empres List 1

Measured on : 2022-09-13
Number of greening cycles : 1
Leaf color list : 5GY:3/2 5GY:3/2 5GY:3/2 5GY:3/2
Number of leaves : 4
Leaf condition : color change
Predominant leaf color : 5GY:3/2
Number of the same plants : 1

Measured on : 2022-09-14
Number of greening cycles : 1
Leaf color list : 5GY:3/2 5GY:3/2 5GY:3/2









THE GLOBE PROGRAM

EUROPEAN PHENOLOGY CAMPAIGN WEBINAR

# Our Spring with Trees

Teachers and students share  
experiences and inspiration from  
the Spring Campaign

31 May 2023



Picture by Vilnius Fabijoniškes gymnasium, Lithuania

# Spring on Our Trees



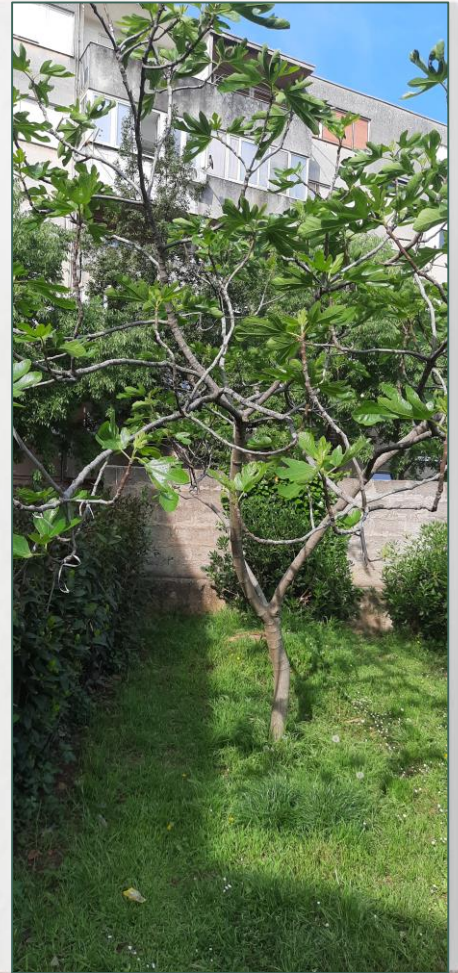
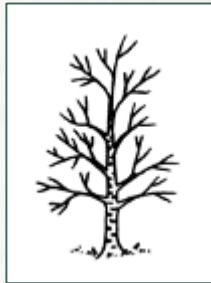
# Aktivnost 1 – Moje stablo

1. Odabrati stablo (višnja, lipa, lješnjak, hrast, breza, bukva, smokva)
2. Opisati stablo i mjesto rasta
3. Fotografirati stablo koristeći GrowApp



1. Odabrati stablo i  
odrediti latinsko ime

**Smokva**  
(*Ficus carica*)



## Školsko dvorište - SMOKVA 2: GRN - 02

### 2. Opis mjesta rasta

- GPS koordinate
- nadmorska visina



Site Name \* \* indicates a field is required

Školsko dvorište - SMOKVA 2: GRN - 02

Site ID 268228

Coordinates

Latitude \*  °  North  South

Longitude \*  °  East  West

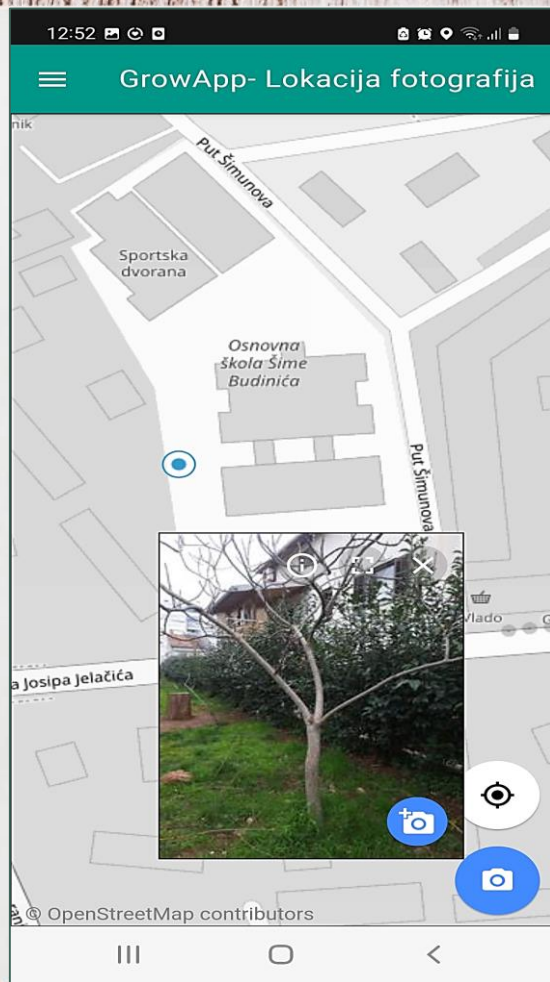
Elevation \*  m [Set elevation](#)

Source of Coordinates Data \*  GPS  Other

Karta Satelit

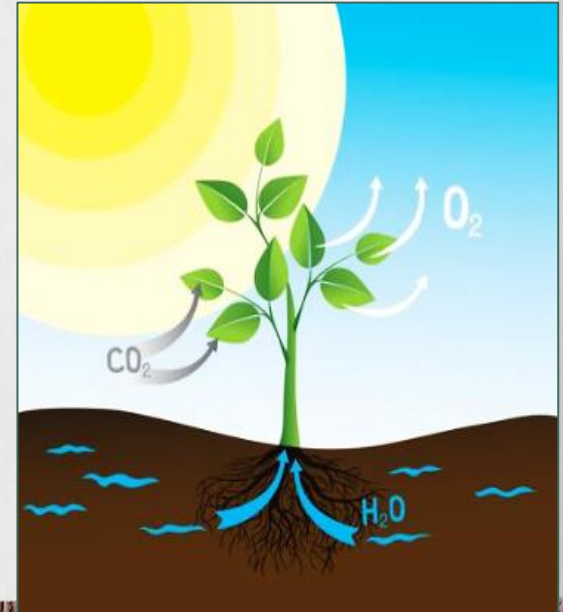
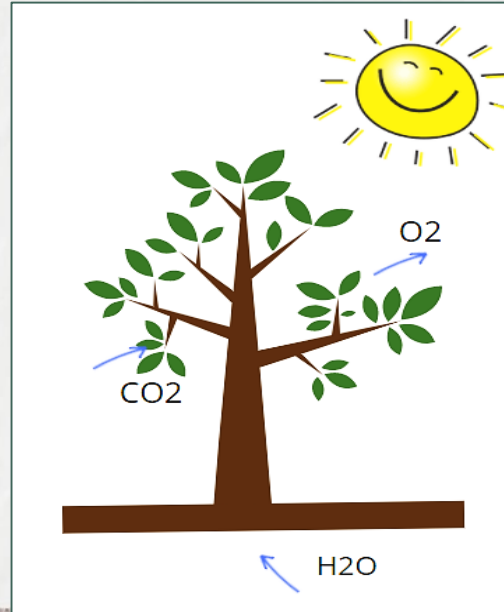
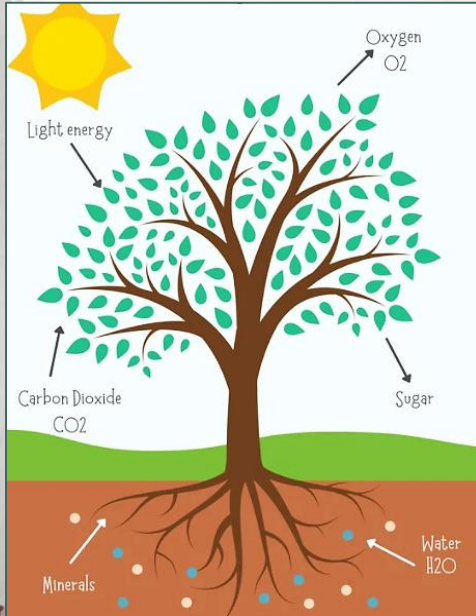
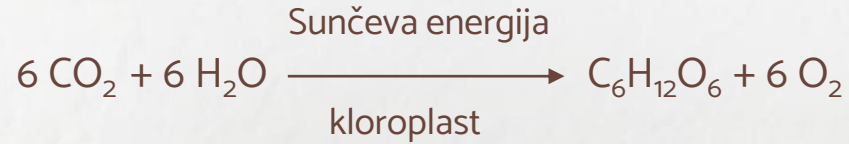
A world map showing the location of the site in Croatia, marked with a red pin. The map displays various countries and regions, including Europe, Africa, Asia, and Australia. The red pin is located in the Balkan region, specifically in Croatia. The map also shows the North Atlantic Ocean and the Mediterranean Sea.

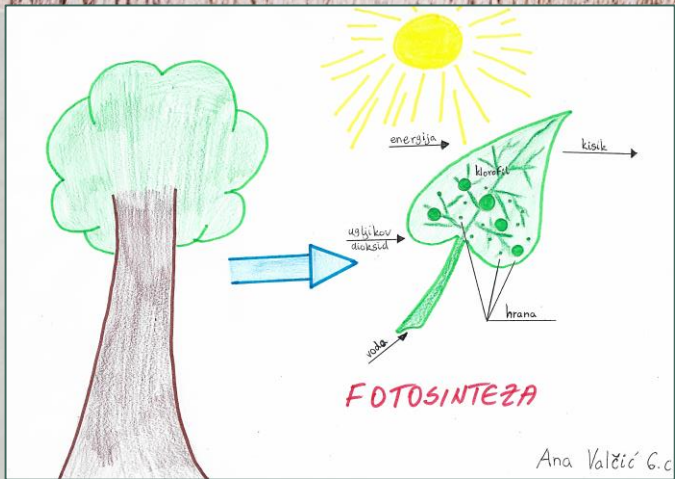
### 3. Fotografirati stablo koristeći GrowApp



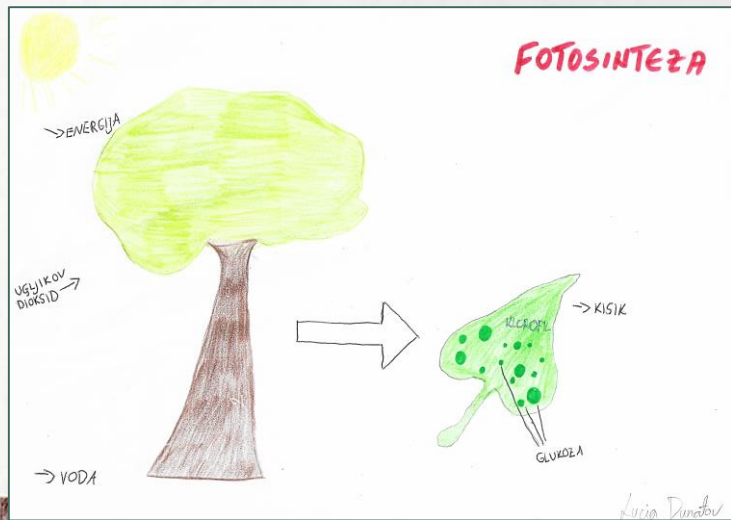
# Što je potrebno za rast i razvoj mog stabla?

Fotosinteza





# Učnički crteži fotosinteze

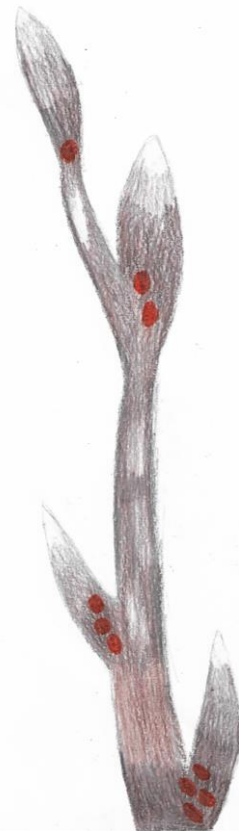
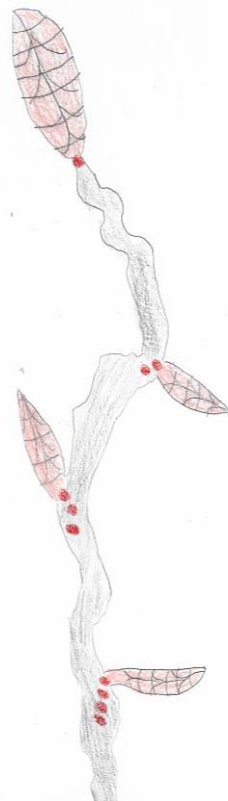


# Aktivnost 2 – Praćenje pupova

1. Označiti 4 pupa na grani stabla okrenutoj prema jugu
2. Promatrati pupove dva puta tjedno
3. Pratiti temperaturu i oborine



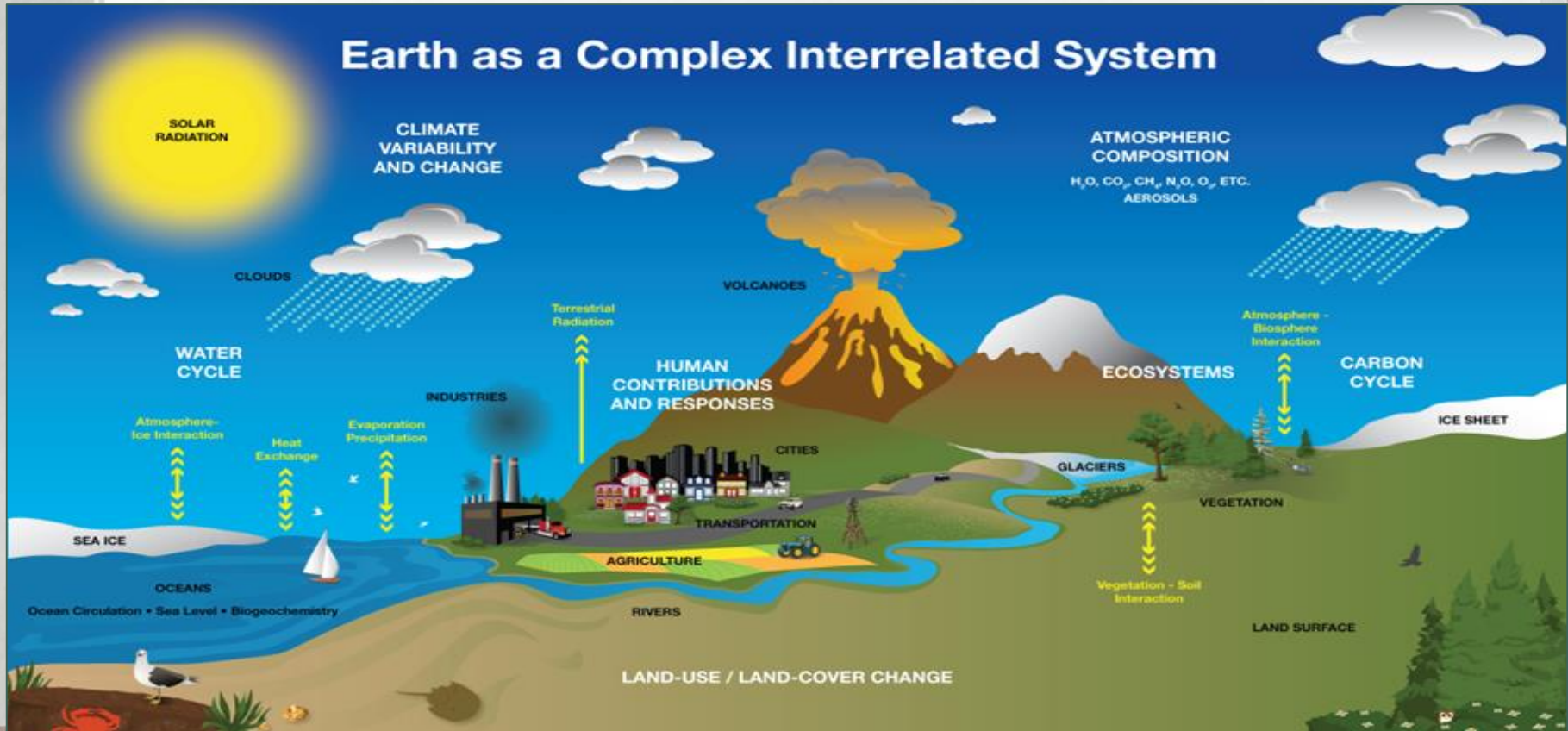
## *Učenički crteži pupova smokve*







# Istražili smo: Povezanost ciklusa na Zemlji

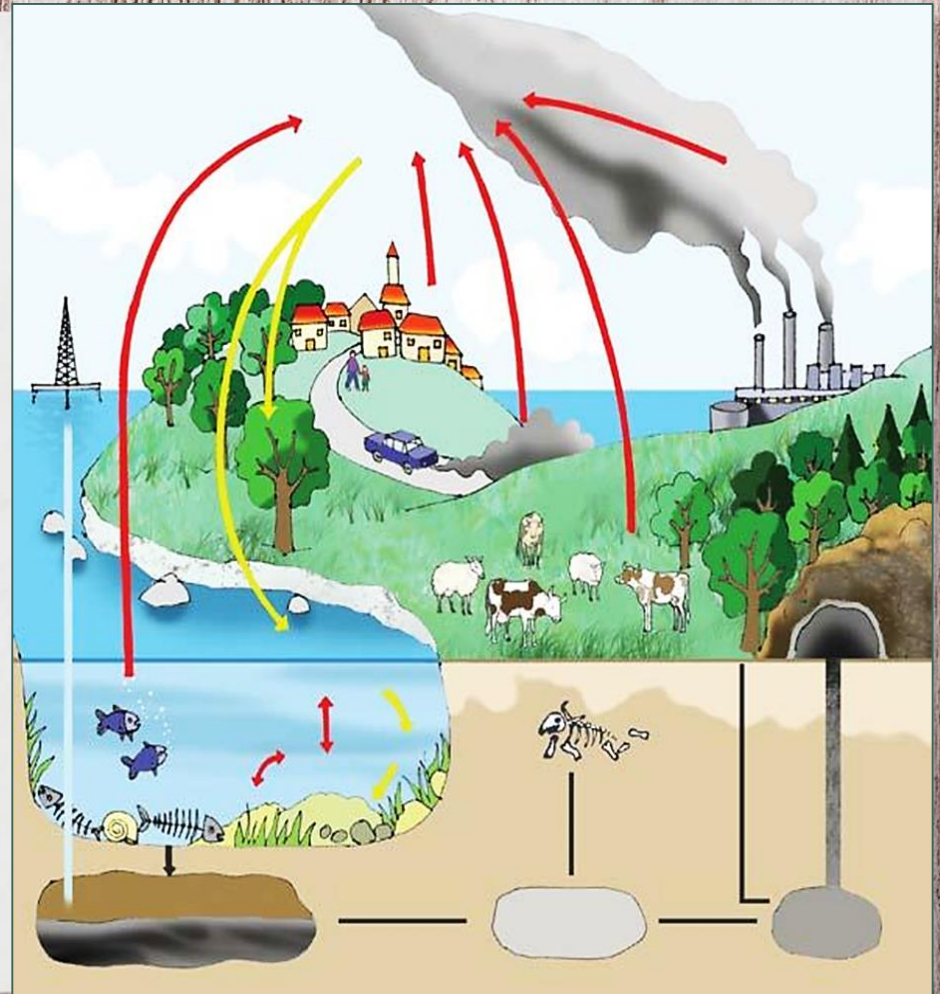
## Earth as a Complex Interrelated System



# Ciklus ugljika

## Legenda

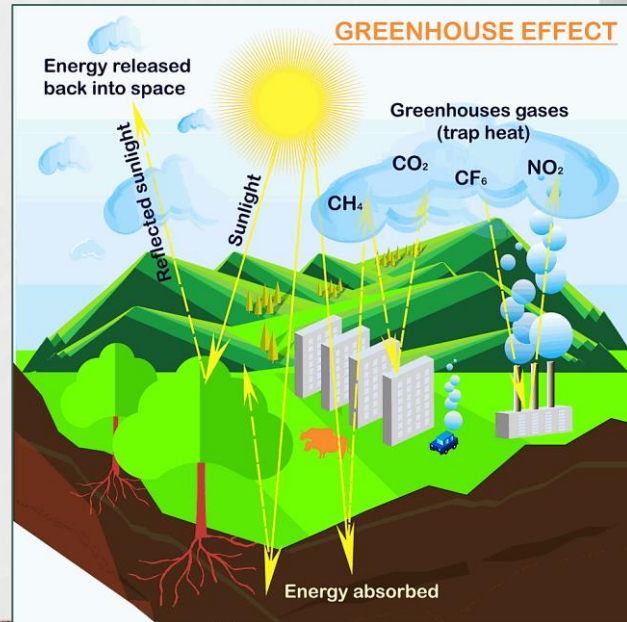
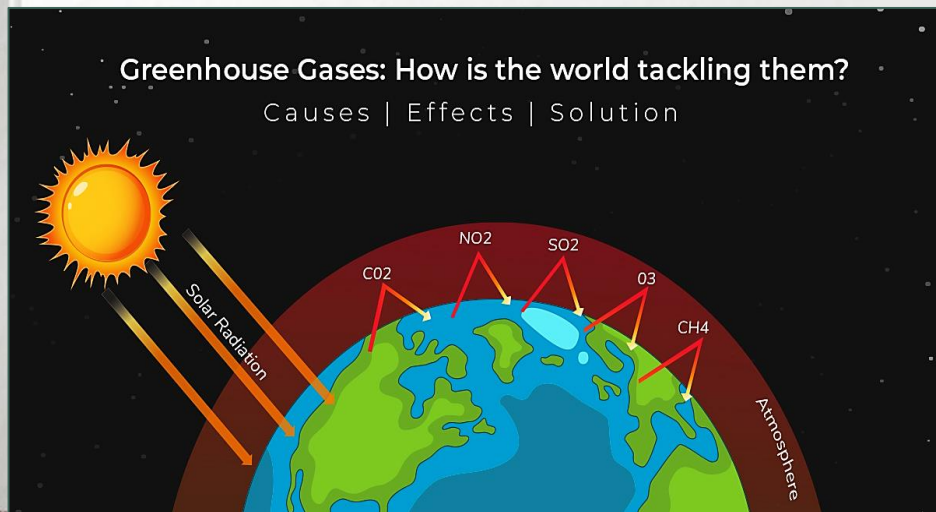
-   $\text{CO}_2$  - disanje biljaka, životinja, ljudi, razgradnja i ispušni plinovi
-   $\text{O}_2$  - fotosinteza biljaka i algi



## Istražili smo: Efekt staklenika

- povećana koncentracija CO u zraku zbog izgaranja fosilnih goriva
- propušta sunčevu energiju kroz atmosferu do površine Zemlje
- otežava izlazak toplinske energije iz atmosfere

Plinovi s takvim svojstvom nazivaju se staklenički plinovi.  
Pojava zadržavanja topline naziva se efekt staklenika.



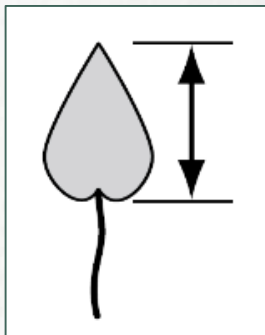


## *Učenički crteži efekta staklenika*

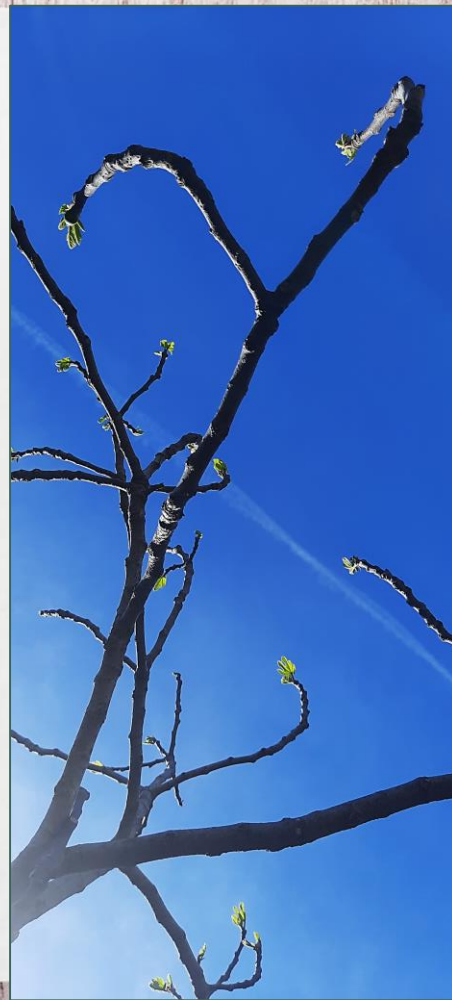


## Aktivnost 3 – Prvi listovi

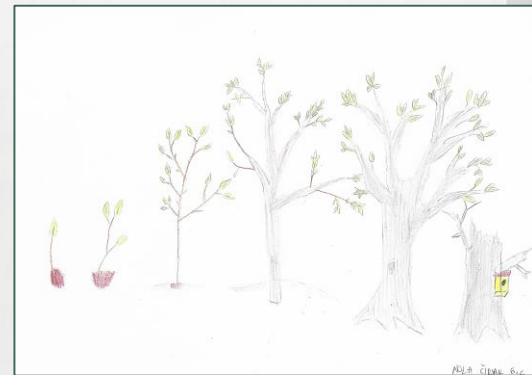
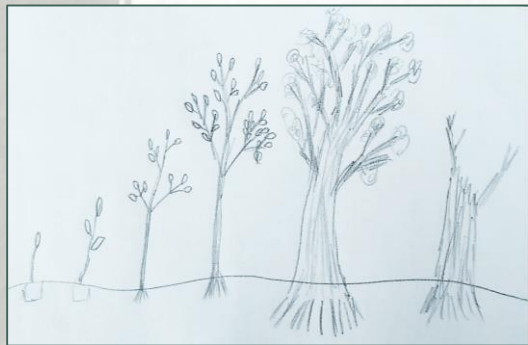
1. Promatrati odabranu granu
2. Zabilježiti “budburst” kada se otvori pupoljak (vidi se vrh zelenog lista)
3. Izmjeriti ravnalom duljinu lista koji raste iz pupoljka bez peteljke najmanje dva puta tjedno, a zatim svakodnevno



14.4.2023.



## Ciklus ugljika u mom stablu - učenički radovi



Toma  
Dunovic  
10

## Stabla u školskom dvorištu – razvojne faze

1) mlado stablo



2) zrelo stablo



3) staro stablo



4) mrtvo stablo







NAŠE STABLO SMOKVE  
STARO JE 10 GODINA,  
A JORGOVAN 5 GODINA.



## Aktivnost 4 – Green Up Data

1. Učitati svoje podatke na [globe.gov](https://www.globe.gov)
2. Postaviti graf izbijanja pupoljaka stabla na GLOBE alatu za vizualizaciju
3. Usporediti svoje podatke s podacima prethodnih godina i podacima druge škole
4. Podijeliti svoj grafikon u raspravi u forumu uz komentar kako se podaci razlikuju od drugih godina i drugih škola



# Green-up

## Tree and Shrub Green-Up Data Sheet

School Name: \_\_\_\_\_ Study Site: \_\_\_\_\_

Observer Names: \_\_\_\_\_

Plant Scientific Name: Genus \_\_\_\_\_ Species: \_\_\_\_\_

Plant Common Name: \_\_\_\_\_

Green-Up Cycle: \_\_\_\_ Year: \_\_\_\_

### Tree and Shrub Green-Up

Date (day & month)	Leaf 1 (dormant, swelling, budburst, leaf length (mm))	Leaf 2 (dormant, swelling, budburst, leaf length (mm))	Leaf 3 (dormant, swelling, budburst, leaf length (mm))	Leaf 4 (dormant, swelling, budburst, leaf length (mm))	Data entry ✓

## Data Entry

The GLOBE Program  
Science Data Entry

Latitude 44.11636, Longitude 15.23061,  
Elevation 10m, SITE\_ID: 144983 [Edit site](#)

+ [Arbanasi - Karma 2019:SCS](#)  
Latitude 44.10129, Longitude 15.23887,  
Elevation 2m, SITE\_ID: 146185 [Edit site](#)

+ [Arbanasi - Karma 2020:SCS](#)  
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Elevation 2m, SITE\_ID: 191114 [Edit site](#)

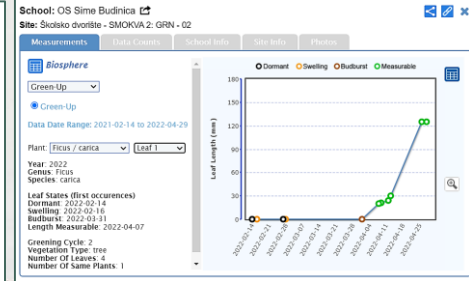
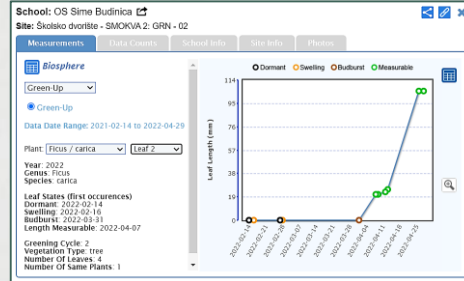
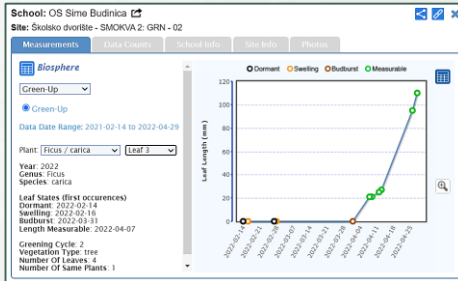
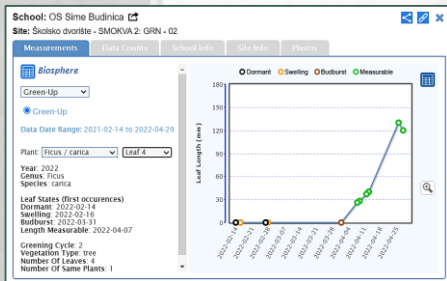
- [Školsko dvorište - SMOKVA 2: GRN - 02](#)  
Latitude 44.117294, Longitude 15.236458,  
Elevation 0m, SITE\_ID: 268228 [Edit site](#)

Greening

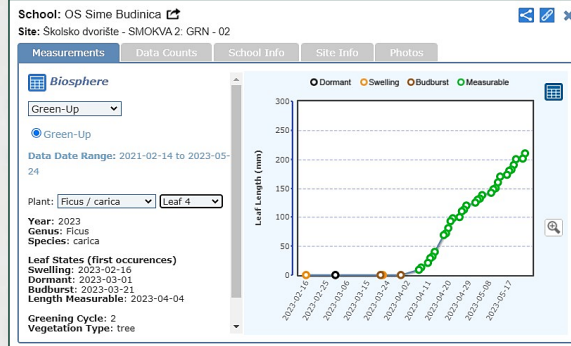
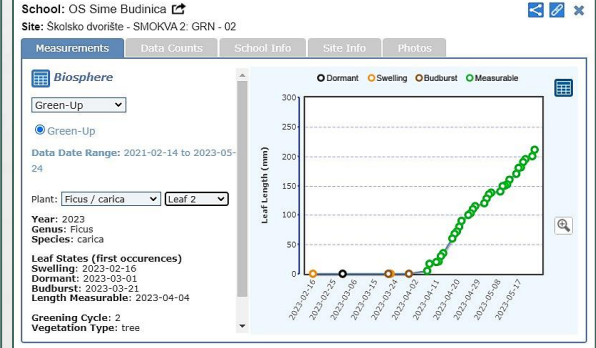
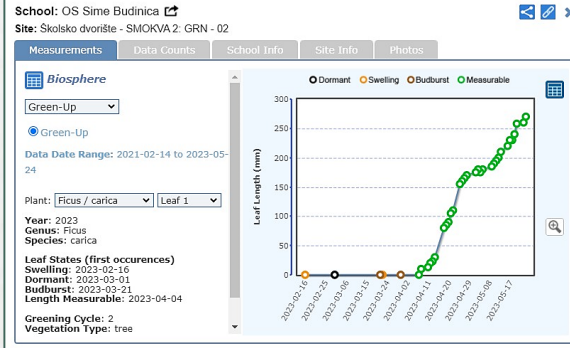
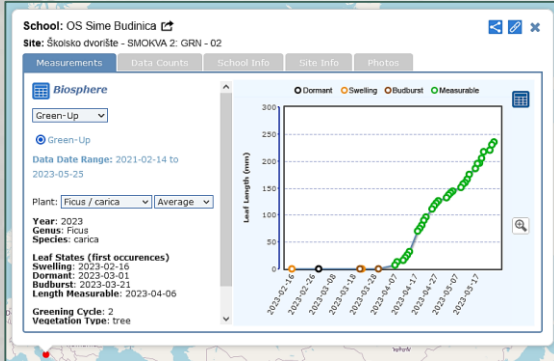
Green Up/Green Down

New observation

+ [Arbanasi - Karma 2022:SCS](#)  
Latitude 44.101408, Longitude 15.238642,  
Elevation 2m, SITE\_ID: 268247 [Edit site](#)



# 24.5.2023. OS Sime Budinica



# OS Sime Budinica

# Medicinska škola Ante Kuzmanića

School: OS Sime Budinica [↗](#)

Site: Školsko dvorište - SMOKVA 2: GRN - 02

Measurements

Data Counts

School Info

Site Info

Photos

Biosphere

Green-Up

Green-Up

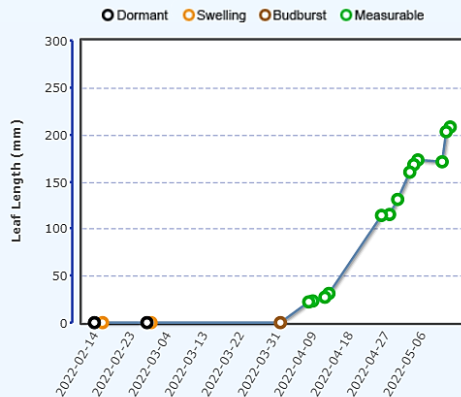
Data Date Range: 2021-02-14 to 2022-05-13

Plant:

Year: 2022  
Genus: Ficus  
Species: carica

Leaf States (first occurrences)  
Dormant: 2022-02-14  
Swelling: 2022-02-16  
Budburst: 2022-03-31  
Length Measurable: 2022-04-07

Greening Cycle: 2  
Vegetation Type: tree  
Number Of Leaves: 4  
Number Of Same Plants: 1



School: Medicinska škola Ante Kuzmanića [↗](#)

Site: SMOKVA

Measurements

Data Counts

School Info

Site Info

Photos

Biosphere

Green-Up

Green-Up

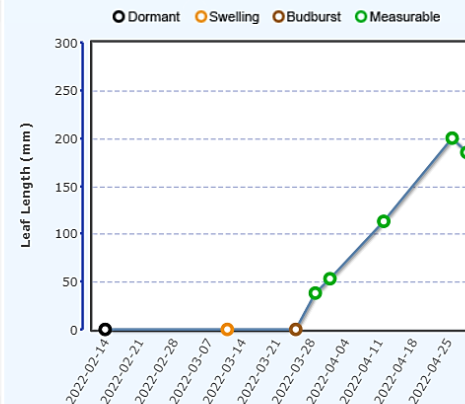
Data Date Range: 2021-02-18 to 2022-04-29

Plant:

Year: 2022  
Genus: Ficus  
Species: carica

Leaf States (first occurrences)  
Dormant: 2022-02-14  
Swelling: 2022-03-11  
Budburst: 2022-03-25  
Length Measurable: 2022-03-29

Greening Cycle: 2  
Vegetation Type: tree  
Number Of Leaves: 4  
Number Of Same Plants: 1





**Smokva**  
(*Ficus carica*)  
18.5.2023.






## DISCUSSION FORUM

### Elementary school Šime Budinić Zadar, Croatia - Our fig - Spring 2023.

 Zrinka Klarin, modified 2 Months ago.

Padawan Posts: 8 Join Date: 9/30/12  Recent Posts

Our activities published by Padlet

Link <https://padlet.com/zrinkaklarin/european-phenology-campaign-rlhthffzx2ay2v2b>

Elementary school Šime Budinić Zadar, Croatia

GPS coordinates N 44° 07' 02" E 15° 14' 10"


Fig tree - Latin name: Ficus carica

Current temperature 11 C



[https://www.globe.gov/web/european-phenology-campaign/overview/discussion-forums/-/message\\_boards/category/101770999](https://www.globe.gov/web/european-phenology-campaign/overview/discussion-forums/-/message_boards/category/101770999)

### Elementary school Šime Budinić Zadar, Croatia - Our fig - Spring 2023.

 Zrinka Klarin, modified 17 Days ago.

Padawan Posts: 8 Join Date: 9/30/12  Recent Posts

Our activities published by Padlet  
Activity 2

Link <https://padlet.com/zrinkaklarin/european-phenology-campaign-rlhthffzx2ay2v2b>

Elementary school Šime Budinić Zadar, Croatia

GPS coordinates N 44° 07' 02" E 15° 14' 10"

Fig tree - Latin name: Ficus carica

Current temperature 12 C





# Aktivnost 5 – Skala zelenih boja lišća

1. Provjeriti lišće na stablu. Jesu li svi jednako zeleni? Je li zelena boja slična na obje strane lista? Što je s drugim drvećem?
2. Napraviti ljestvicu zelenih boja – Staviti lišće u niz od najsvjetlije do najtamnije nijanse.





*Boje lista smokve*

19.5.2023.



*Boje lista jorgovana*



***Učenički crteži  
Boje lista smokve***

# Suradnja GLOBE škola PADLET

<https://padlet.com/zrinkaklarin/european-phenology-campaign-rlhthffzx2ay2v2b>

## Elementary school Šime Budinić Zadar, Croatia - CŠOD, Slovenia

:Padlet

Zrinka Klarin + 6 • 7 dana  
**European Phenology Campaign**  
Elementary school Šime Budinić Zadar, Croatia - CŠOD - Slovenia, Public School of the village of Letsiysvaye of Martvil Municipality named after Gela Chedia - GRUZIJA (Georgia)

Presentation of school, students and teachers

Šime Budinić Elementary School - Fig Tree


Elementary school Šime Budinić Zadar - photos, paintings, works


CŠOD - Tree

CŠOD - photos, paintings, works


**Anonimno** 1 mjesec dana  
Hello Everyone!  
Public school of elementary school named after Gela Chedia Martvil municipality  
PPTX  
inbound5171329640697790265  
1  
Dodajte komentar

**Zrinka Klarin** 7 mjeseci  
13.10.2022.  
Dodajte komentar

**Zrinka Klarin** 14 dana  
22.4.2022. Earth day  


**Giorgi maradiko St...** 1 mjesec dana  


**Nataša** 7 dana  
Green-up 2023  
BIRCH dormant to budburst  
Green-Up 2023 (March 2023)  
1  
Dodajte komentar

**Zrinka Klarin** 7 mjeseci  
We cleaned our school yard!  


**Zrinka Klarin** 7 mjeseci  
#Fig  
Fig, Ficus carica L.  
PDF  
Fig

Year	Leaf 1	Leaf 2	Leaf 3	Leaf 4
13.4.2022				
14.4.2022				

Year	Leaf 1	Leaf 2	Leaf 3	Leaf 4
13.4.2022				
14.4.2022				

# GLOBE PHENOLOGY TEAM



*Hvala na pažnji!*

**Evaluacija**

<https://forms.office.com/e/RqcAcJuYyb>

FOREST - OUR LIFELONG TEACHER

