

Useful value of invasive alien plants

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at



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PREPOZNAJ, PREDELAJ ALI PREDAJ.



Product planning is becoming more and more distinctly based on the aspect of **sustainable development**, which means that already at the starting point of the design of a new product, its **entire path is defined**, i.e. circle.

Ecological planning of products includes the inclusion of environmental aspects in the development process, as well as all further activities (transport, handling, disposal after the end of its life, etc.), with the aim of reducing the environmental impact of the product throughout its use.

Invasive alien plants

1. Boxelder maple (*Acer negundo*)
2. Bohemian knotweed (*Fallopia x bohemica*)
3. Davids' butterfly bush (*Buddleja davidii*)
4. Curleaf coneflower (*Rudbeckia laciniata*)
5. Horse chestnut (*Aesculus hippocastanum*)
6. Japanese meadowsweet (*Spiraea japonica*)
7. Japanese knotweed (*Fallopia japonica*)
8. Canadian golden rod (*Solidago canadensis*)
9. Cherry laurel (*Prunus laurocerasus*)
10. Amur honeysuckle (*Lonicera maackii*)
11. False indigobush (*Amorpha fruticosa*)
12. Oregon grape (*Mahonia aquifolium*)
13. Southern catalpa (*Catalpa bignonioides*)
14. Staghorn sumac (*Rhus typhina*)
15. Giant goldenrod (*Solidago gigantea*)
16. Rockspray cotoneaster (*Cotoneaster horizontalis*)
17. Black locust (*Robinia pseudoacacia*)
18. Red osier dogwood (*Cornus sericea*)
19. Stinking fleabane (*Dittrichia graveolens*)
20. Cherry plum (*Prunus cerasifera*)
21. Thunbergs' barberry (*Berberis thunbergii*)
22. Topinambur (*Helianthus tuberosus*)
23. Honey locust (*Gleditsia triacanthos*)
24. Tree of heaven (*Ailanthus altissima*)
25. Himalayan balsam (*Impatiens glandulifera*)

Japanese knotweed



Canadian and giant golden rod



Staghorn sumac



Cherry plum



Topinambur



Tree of heaven



Himalayan balsam



Useful value of IAPS

Systematically addressing the unresolved issues regarding the management of invasive alien plants, in terms of a **zero-waste approach and a circular economy**, are the key objectives of such projects, which are taking place intensively throughout the EU, where the key is to establish a working circle that ensures the transition **from harmful to useful**, with **simultaneous active involvement of residents**.

The removal of invasive alien plants is currently still relatively unorganized and in most cases, where it takes place, they are **composted** or **burned**.

It can be done differently!

Fields of use of IAPS

1. Paper and textile products
2. By-products as an input of raw materials for industry
3. Wood products
4. Wood leftovers processing
5. IAPS as a food origin
6. Dyes and hybrid coatings
7. Extracts for the control of organisms that are harmful to plants

1.1 Paper products

Invasive alien plants are a rich source of **cellulose fibers** from which it is possible to produce paper pulp for *machine* or *manual* papermaking (Pulp and Paper Institute).



SCREEN PRINTING



1.1 Paper products – printing paste



rhizomes of Japanese knotweed



leaves of Japanese knotweed








flowers of Himalayan balsam



flowers of Canadian goldenrod

| Recipe No. | Plant material | Formulation | Sample |
|------------|---------------------------|--|--------|
| 1 | Japanese knotweed rhizome | <ul style="list-style-type: none">15 g of binder Legante SE conc.1.8 g of thickener Clear MCSto 100 g of water | |
| 2 | | <ul style="list-style-type: none">15 g of binder Legante SE conc.1.8 g of thickener Clear MCSto 100 g of water | |
| 3 | | <ul style="list-style-type: none">15 g of binder Legante SE conc.1.8 g of thickener Clear MCSto 100 g of water | |
| 4 | | <ul style="list-style-type: none">15 g of binder Legante SE conc.1.8 g of thickener Clear MCSto 100 g of water | |
| 5 | | <ul style="list-style-type: none">15 g of binder Legante SE conc.1.8 g of thickener Clear MCSto 100 g of water | |

1.1 Paper products – printing paste/screen printing

| Recipe No. | Plant material | Formulation | Sample |
|------------|---------------------------|--|---|
| 1 | Japanese knotweed rhizome | <ul style="list-style-type: none">• 15 g of binder Legante SE conc.• 1.8 g of thickener Clear MCS• to 100 g of water• 1 g of dye |  |
| 2 | | <ul style="list-style-type: none">• 15 g of binder Legante SE conc.• 1.8 g of thickener Clear MCS• to 100 g of water• 2 g of dye |  |
| 3 | | <ul style="list-style-type: none">• 15 g of binder Legante SE conc.• 1.8 g of thickener Clear MCS• to 100 g of water• 3 g of dye |  |
| 4 | | <ul style="list-style-type: none">• 15 g of binder Legante SE conc.• 1.8 g of thickener Clear MCS• to 100 g of water• 4 g of dye |  |
| 5 | | <ul style="list-style-type: none">• 15 g of binder Legante SE conc.• 1.8 g of thickener Clear MCS• to 100 g of water• 5 g of dye |  |

1.1 Paper products – print quality



Japanese knotweed paper

Office paper

Recycled paper

1.1 Paper products – screen printing



Japanese knotweed paper

Office paper

Recycled paper

1.1 Paper products – screen printing

Sedite na morskem dnu nedaleč od obale indonezijskega otočja. Morje ni globoko – kakih pet metrov – in svetlobe je več kot dovolj. Voda je topla, kot v takšnem tropskem okolju tudi pričakujete. Na strani vas obdaja rahlo vzvalovan temno siv pesek, ki ga ponovno prekriva nekakšna zelena usedlina. Med raziskovanjem okolice najdejo hišico. Čokata je, iz nje izrašča šest močnih bodic. Moški se v njej. Ali pa je njen prvotni lastnik že davno preminul in hišo naseljuje rak samotarec. Radovedni jo obrnete. Vrsta prisesek Hobotnica. Natančneje, pripadnica vrste, ki ji pravijo tudi koka

Fotografija, ki jo v rokah drži mlada ženska, ni dosti večja od poštne znamke. A je vseeno edina fotografija njenega moža, ki je našla v hiši staršev. Ti pred leti niso odobraval njene poroke, saj je bil on samo ribič iz obalnega mesta Mannar, njena družina pa je že več rodov živela v Jaffni, prestolnici šrilanške Severne province. A kot je razbrati s fotografije, je mož, tako kot ona, tamilskega rodu, vase prepričan in veder moški. Ženska strmi v podobo človeka, ki je izginil pred desetletjem. Ko se potopi v spomine, se ji mahagonijeve oči zalesketajo. Zaljubila sta se v begunskem taborišču na jugu Indije leta 1999, ko ji je bilo 17

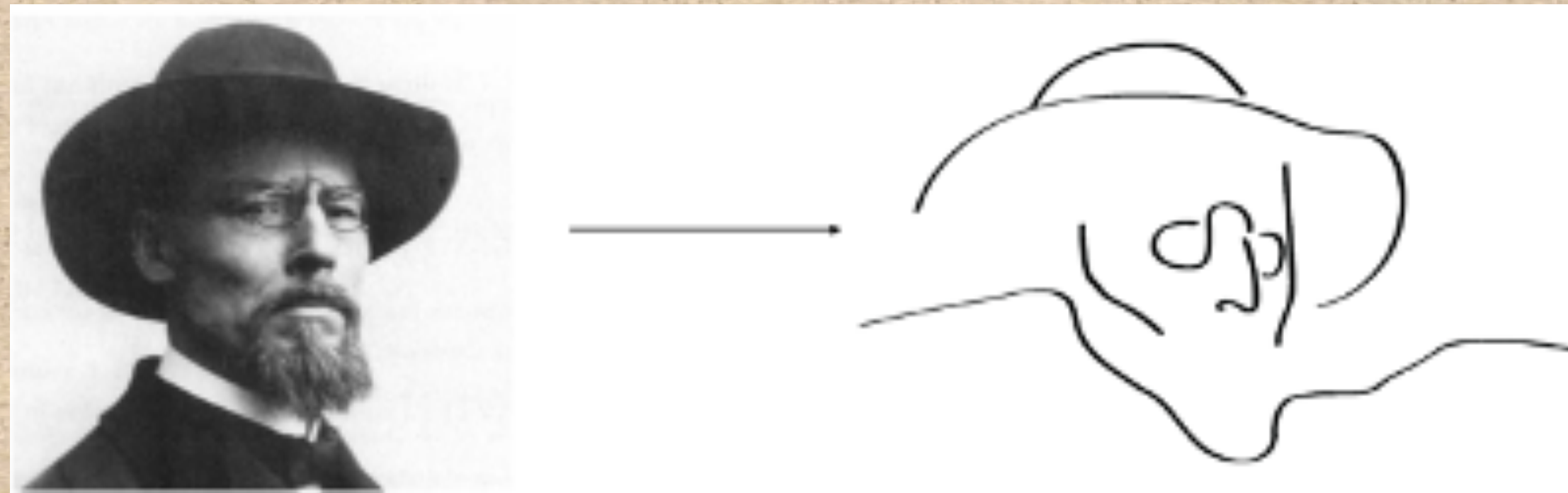
Arial, 8 pt, office paper

Times New Roman, 8 pt, ITR paper



Testing

1.1 Paper products – jewelry packaging



Janja Cerar &
Patricija Selič



Jasmina Ajdini



Aleša Istenič &
Eva Štirn



Patricija Pevec &
Kristina Sojer





1.1 Paper products – bookmarks



Within the APPLAUSE project, paper was made from invasive non-native plants.

www.ljubljana.si/en/applause

European Union
European Regional Development Fund





Papir smo v okviru projekta **APPLAUSE** izdelali iz invazivnih tujerodnih rastlin.

Evropska unija
Evropski sklad za regionalni razvoj




Within the **APPLAUSE** project, paper was made from invasive non-native plants.

European Union
European Regional Development Fund

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Evropska unija
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www.ljubljana.si/en/applause







Korenine



European Regional Development Fund
www.ljubljana.si/en/applause

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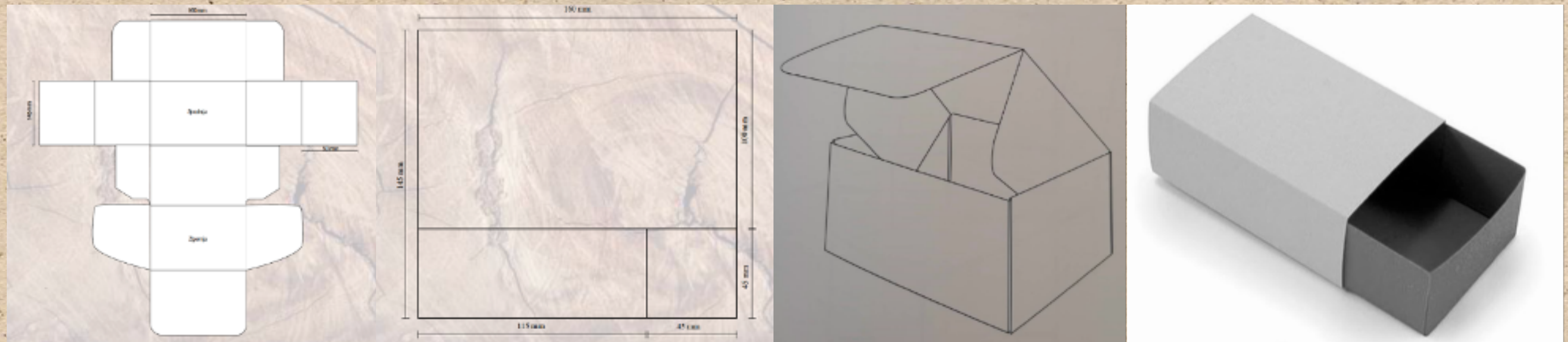
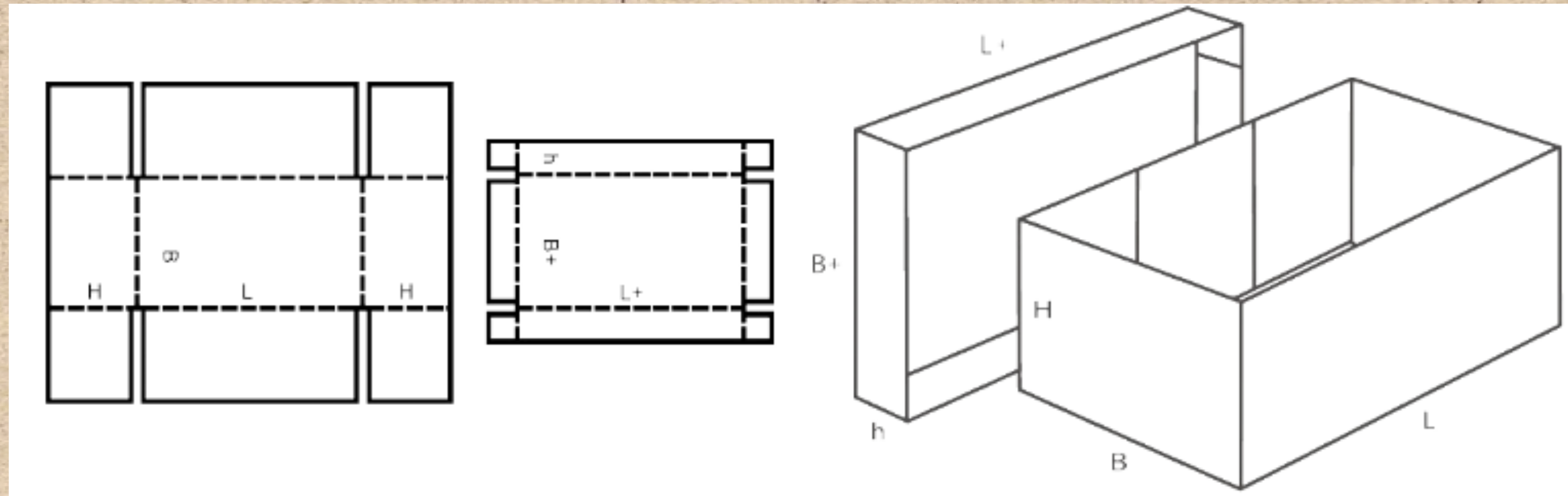
Papir smo v okviru projekta **APPLAUSE** izdelali iz invazivnih tujerodnih rastlin.





Vsaka kazalka malo drugačna

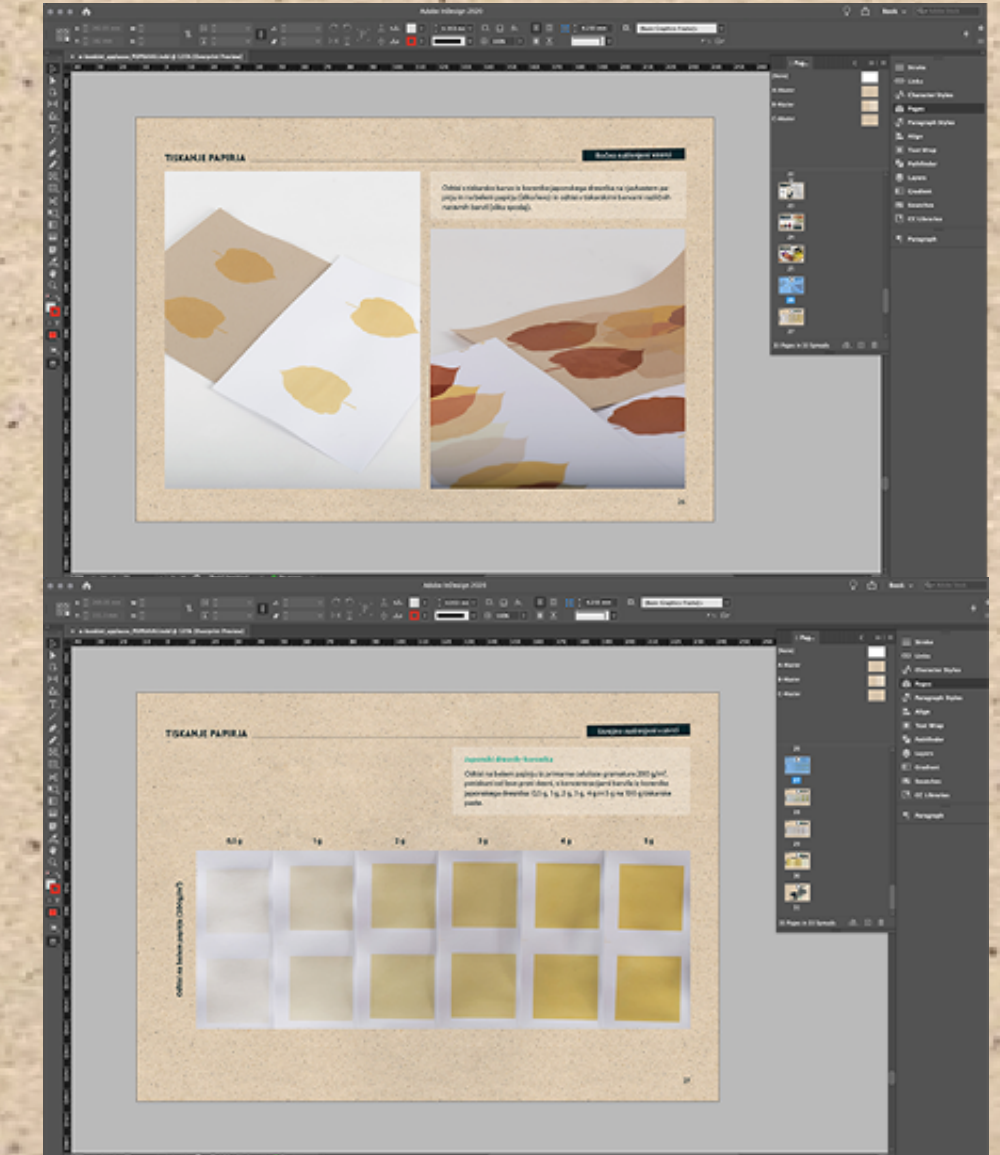
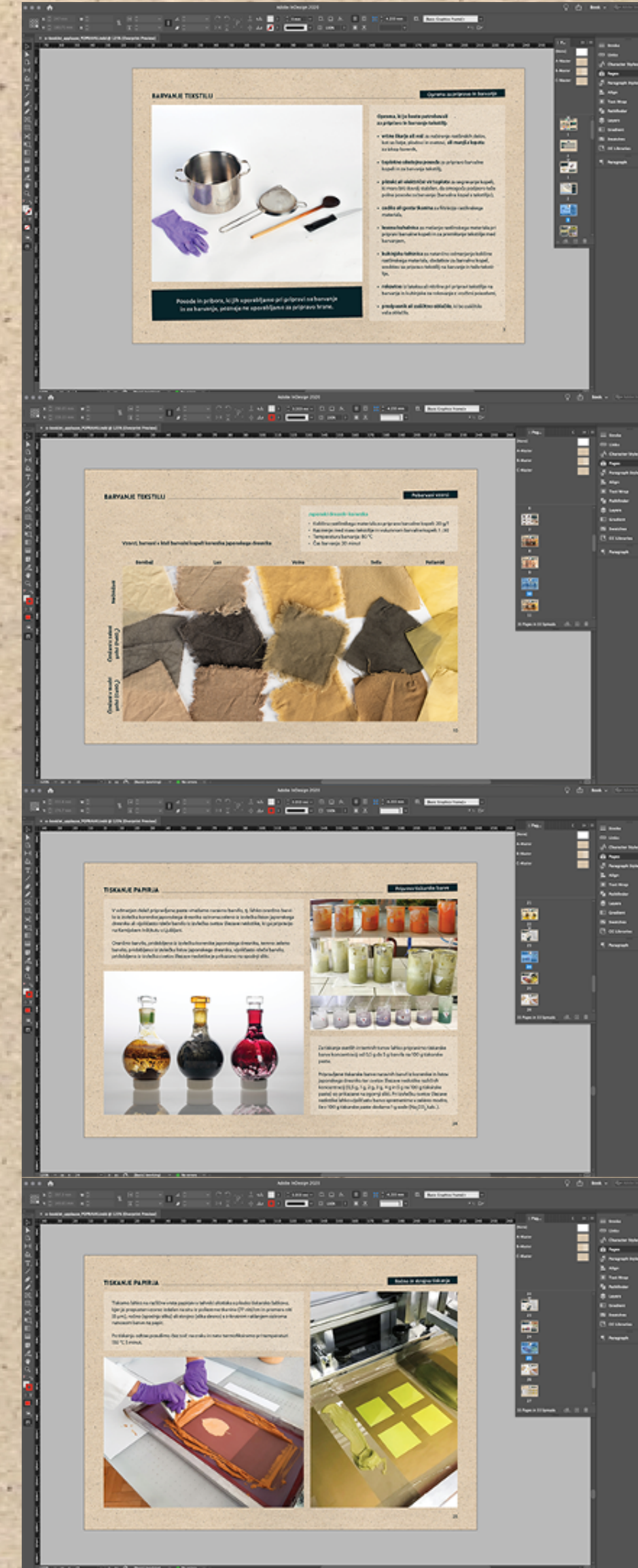
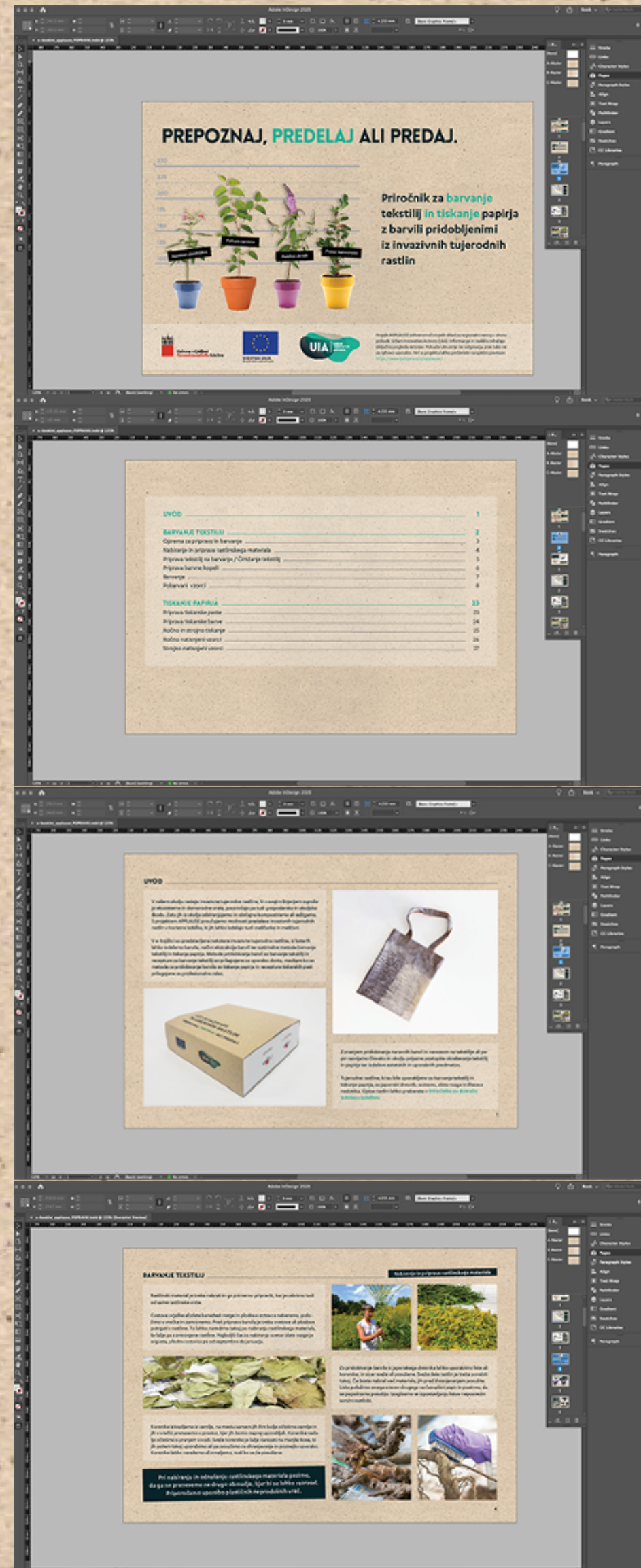
1.1 Paper products – box for wood samples (microscopy), 1/2



1.1 Paper products – box for wood samples (microscopy), 2/2

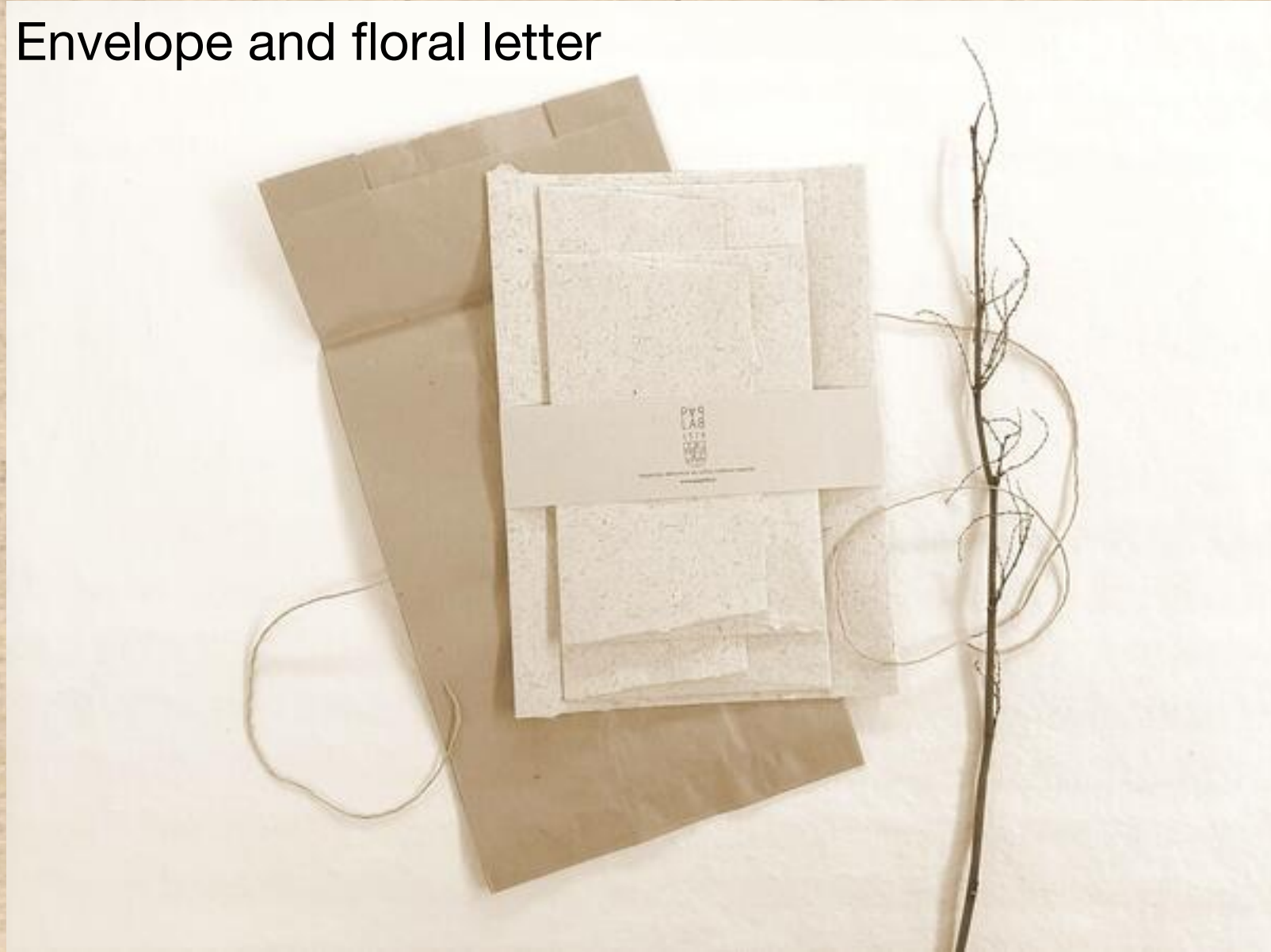


1.1 Paper products – eBook



1.1 Paper products

Envelope and floral letter



Seed paper



Paper pot



Shopping bag

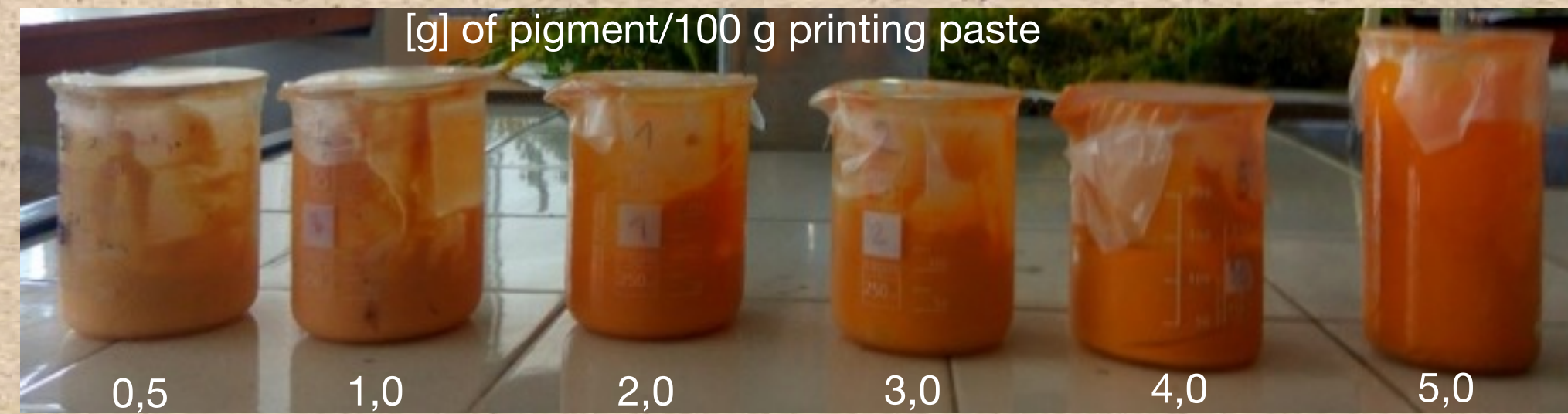


1.2 Textile products – plant source



| Recipe No. | Plant material | Formulation | Sample |
|------------|---------------------------|--|--------|
| 1 | Japanese knotweed rhizome | <ul style="list-style-type: none">• Textile material: cotton• Concentration of extract: 20 g/L• Dyeing temperature: 80 to 95 °C• Dyeing time: 60 min | |
| 2 | | <ul style="list-style-type: none">• Textile material: wool• Concentration of extract: 10 g/L• Addition of actetic acid in dyebath• Dyeing temperature: 60 °C• Dyeing time: 60 min | |
| 3 | | <ul style="list-style-type: none">• Textile material: wool• Concentration of extract: 60 g/L• Dyeing temperature: 80 °C• Dyeing time: 60 min | |
| 4 | | <ul style="list-style-type: none">• Textile material: polyamide• Concentration of extract: 60 g/L• Dyeing temperature: 80 °C• Dyeing time: 80 min | |
| 5 | | <ul style="list-style-type: none">• Textile material: polyester• Concentration of extract: 40 g/L• Dyeing temperature: 60 °C• Dyeing time: 60 min | |

1.2 Textile products – printing



printing paste of Japanese knotweed in 6 concentrations



printing on cotton – manually



printing on cotton – machine

1.2 Textile products – printing



printing paste of Japanese knotweed in 6 concentrations



printing on PES – manually

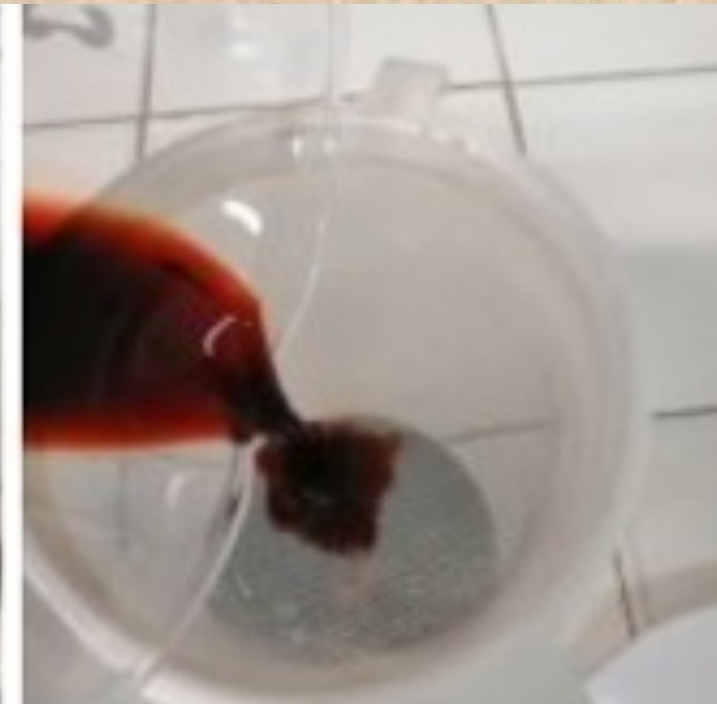


printing on PES – machine

1. Paper and textile products – online presentation of the preparation of pigments and printing paste



dried leaves of Japanese knotweed



dried potato peels

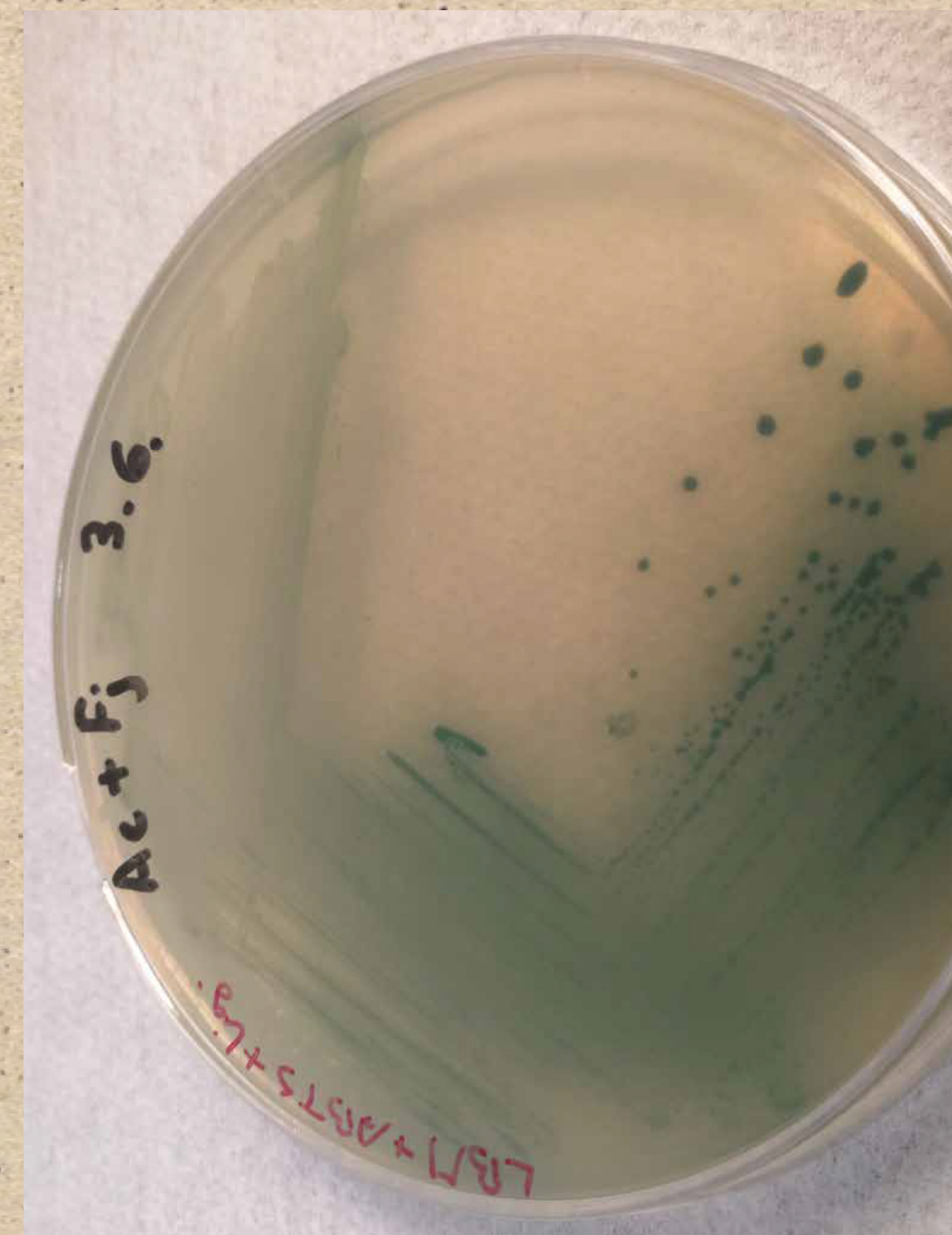


2. By-products as an input of raw materials for industry

In the process of processing the biomass of IAPS, such as e.g. in the production of paper, in addition to cellulose, by-products are also useful, i.e. **lignin** and **sugars**.

Currently, one of the most important industrial sources is **oil** and **its derivatives**, which could be replaced to some extent, since **ferulic acids** can be obtained from **lye** using microbial clones, which together with lignin are converted into useful chemicals (**vanillin** – an intermediate product in the production of pharmaceutical products, cosmetics and other chemicals).

The **sugars present in wood** are useful as a substrate for the cultivation of microbes that process the sugars into **polyhydroxyalkanoates** (PHAs) suitable for the synthesis of **polyesters** (PES).



3. Wood products

Wood pulp can be used to make DIY products, or as biomass for products with a higher added value.



Sieve and frame for handmade paper sheets



Nesting box



Serving board



Xylophone



Picture frame



Wooden letters

4. Wood leftovers processing

Wood biomass processing has a by-product, i.e. **sawdust**, which is usually used as an **energy** source and is to some extent contaminated with petroleum derivatives.

Wood scraps can be processed, via molds, into various **3D composites**, i.e. plates, utensils, etc.

It is possible to make these liquids from wood residues and use them as such as an additive to adhesives, coating agents or as a base for bio-polyurethane foam or as a layer of plywood.



Processing of wood scraps into 3D composites

Mold



Decorative plate



Dining set



Dining set



5. IAPS as a food origin

Topinambur, chery plum and red osier dogwood do not fall under the provisions of **Regulations on novel foods in EU** ((ES) No. 258/97 and (EU) 2015/2283)), such as for example Japanese knotweed, Canadian and giant goldenrod.

Recepies for preparing dishes from IAPS:

1. **topinambur with chanterelles:**

(<https://www.youtube.com/embed/OjToofsHHSI>) or

2. **topinambur chips:**

(<https://www.youtube.com/embed/b3SaB3kpqvQ>) or

3. **cream soup from topinambur:**

(<https://www.youtube.com/embed/oQLpACNASpc>) or

4. **buckwheat porridge from topinambur:**

(https://www.youtube.com/watch?v=_fozil6ouvc&t=23s) or

5. **cherry plum chutney:**

(<https://www.youtube.com/embed/IUBlchU9Boo>) or

6. **cherry plum mess:**

(<https://www.youtube.com/embed/pbk5QTdP8QY>).



5. IAPS as a food origin



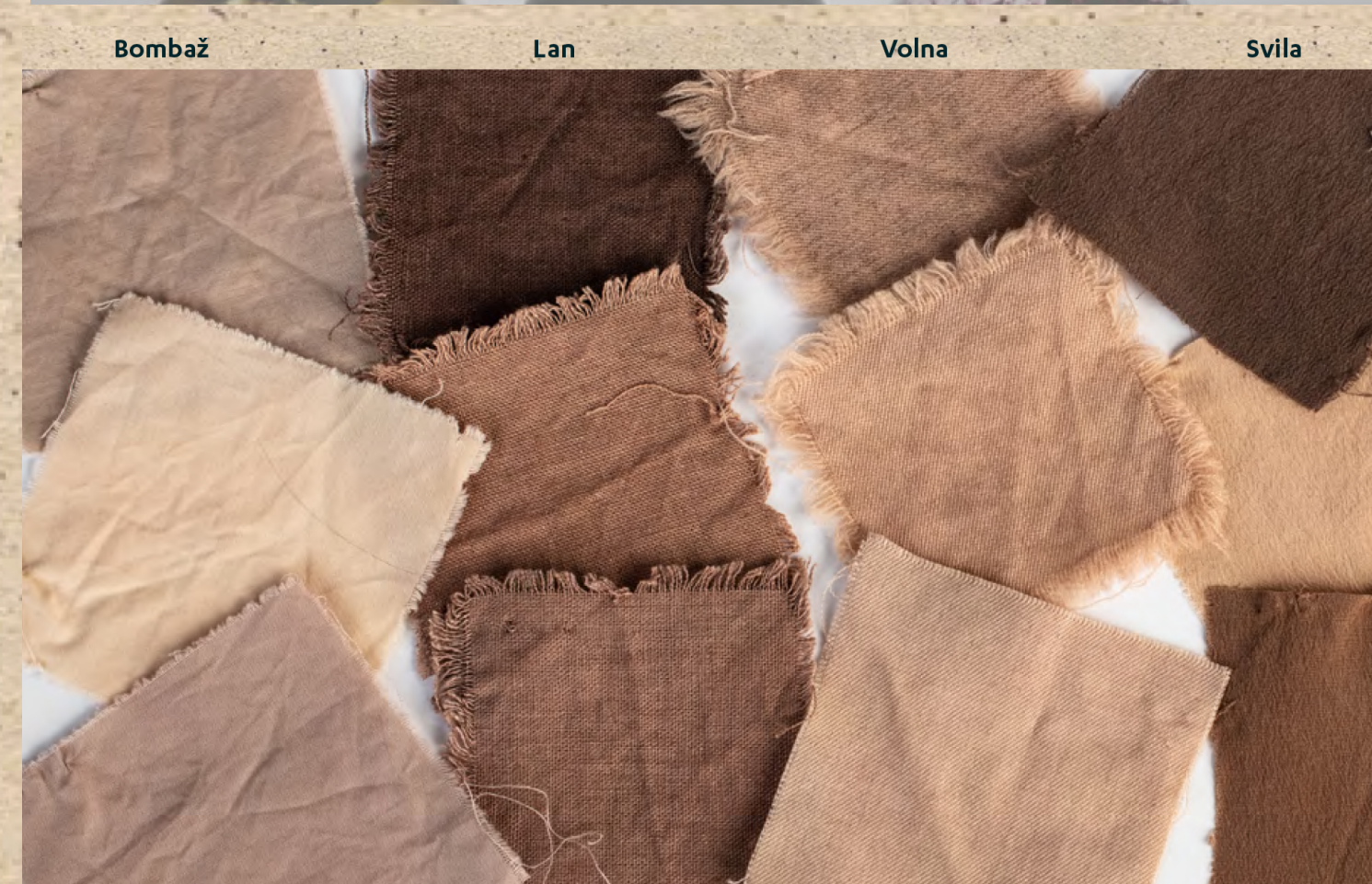
Dodamo tartufe in maslo.

6. Dyes and hybrid coatings

IAPS can also be used as a source of **dyes**, **pigments**, in the dyeing of **textiles** and the preparation of **printing pastes**.

Dyes for textile printing are water extracts, which ensures their wide use in home and school environments.

Extracted dyes can also be included in coatings and layer, where as such they can be used in the coating of glass for the production of **solar cells**, with the help of which the glass's light absorption is increased.



Dyes and hybrid coatings



7. Extracts for the control of organisms that are harmful to plants

Extracts are effective against:

1. insecticides (insects),
2. fungicides (moulds),
3. acaricides (mites),
4. limacidoma (snail) and
5. herbicides (weeds).

Useful invasive alien species for pest control:

1. tree of heaven,
2. staghorn sumac,
3. false indigobush,
4. Bohemian and Japanese knotweed and
5. Canadiand and giant goldenrod.



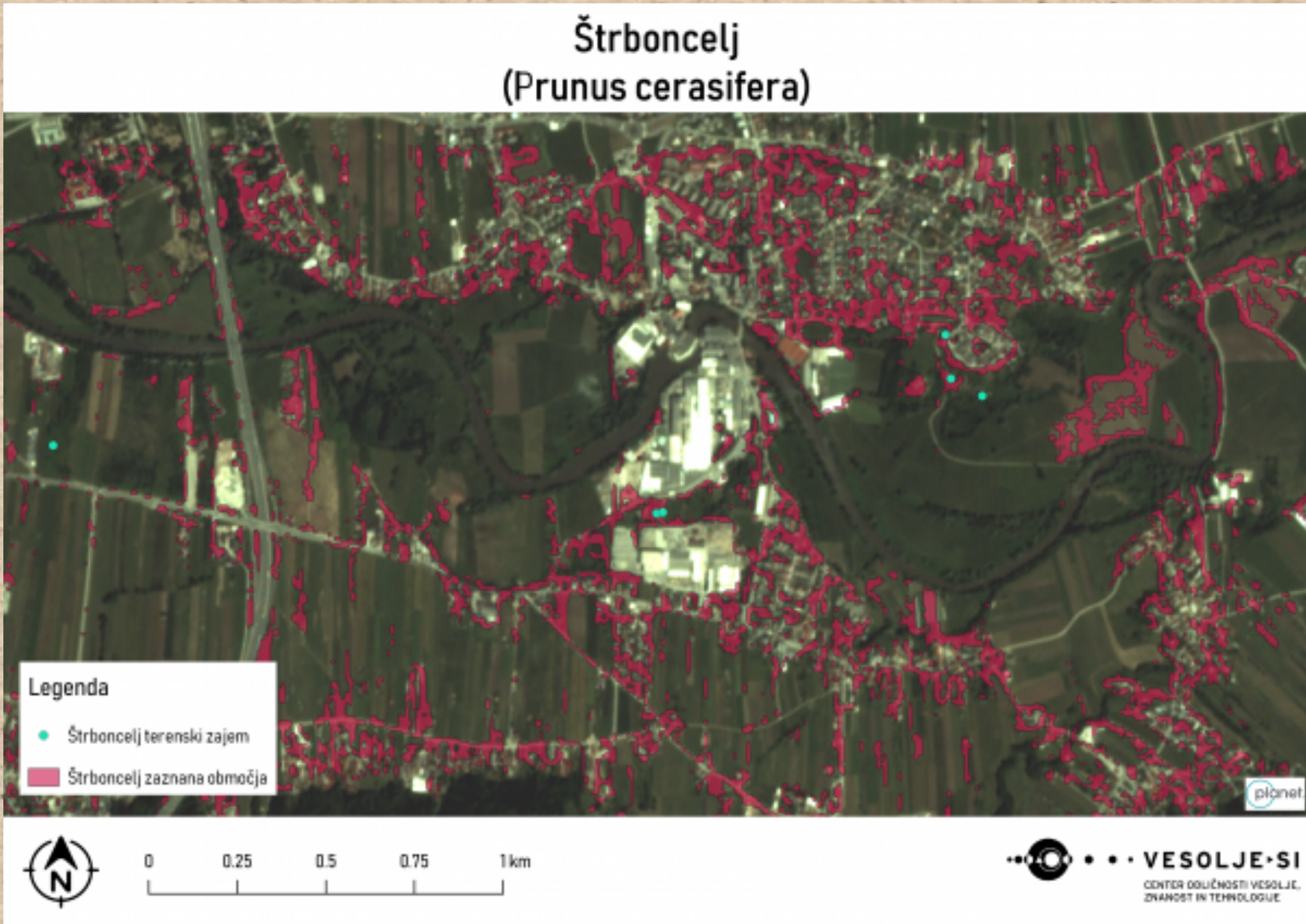
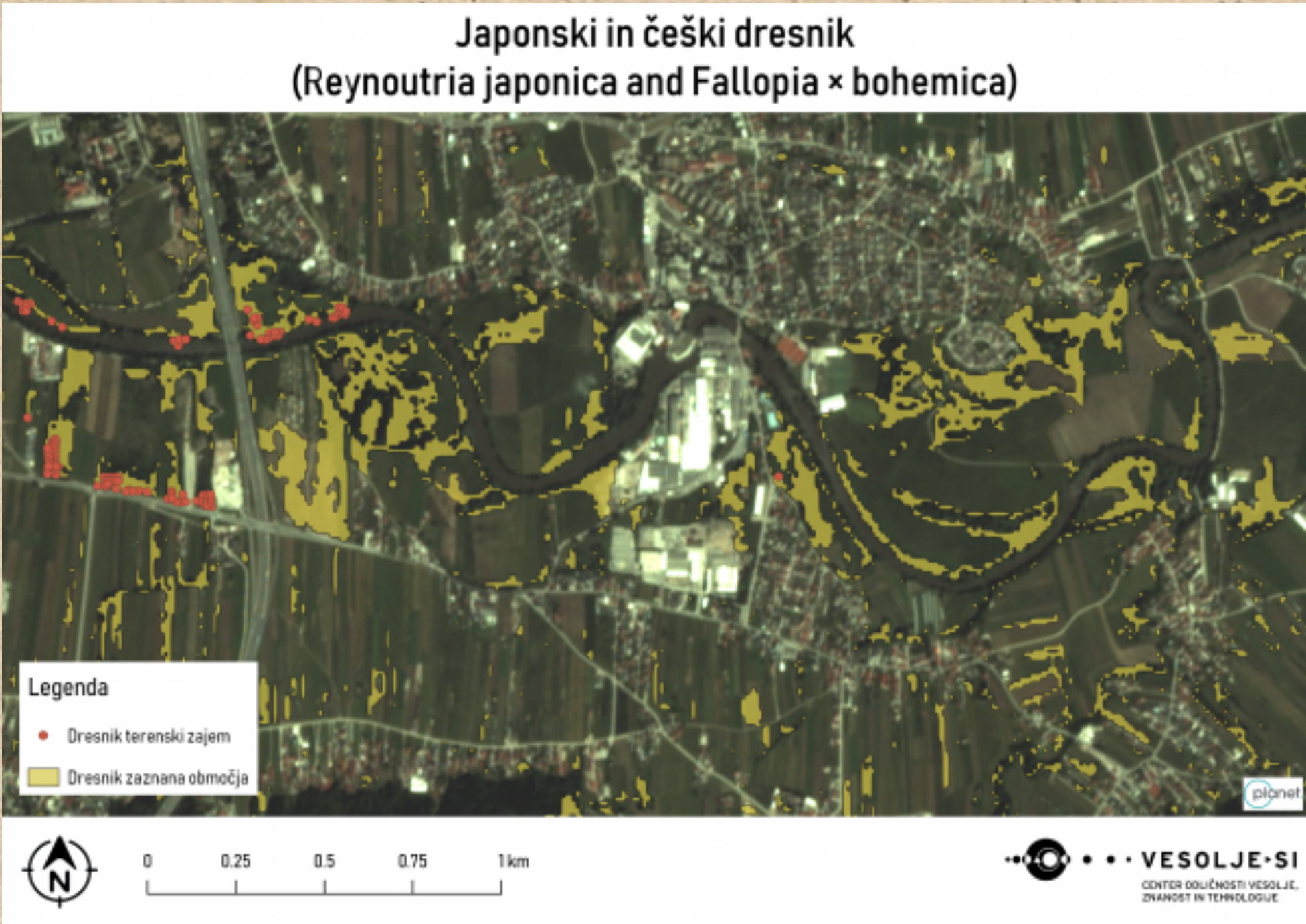
Extracts for the control of organisms that are harmful to plants

Plants (leaves) suitable for the preparation of sprays for the protection of cultivated plants:

1. tree of heaven,
2. staghorn sumac,
3. false indigobush,
4. Bohemian and Japanese knotweed and
5. Canadian golden rod.

Pests, mites and other diseases are sprayed in the morning with a water extract.

Mapping the extent of IAPS





We cannot resist development and the desire for comfort.

We are **responsible** for what we do, and especially **for what we don't do.**

In every thing,
there can also be something good,
if we only **want to see it!**

Thank you

at

The entire collection of useful tips can be found in the website of the EU Project Applause (UIA02-228):

<https://www.ljubljana.si/sl/moja-ljubljana/applause/>