

# Sinice a řasy v biotechnologii

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# Využití sinic a řas dnes

- Prakticky ve všech zemích s mořským pobřežím nebo s jezery, rybníky, prameništi nebo řekami
- Dnešní využití v kuchyni na řadu způsobů – v salátech, nakládaných nebo fermentovaných produktech
- Jako přísady do polévek, dušeného masa, omáček, jako pražené do čaje, do desertů nebo želatin

Table II.C.1.2. *Algae eaten by humans now and in the past***Celkem 214 druhů sinic a řas**

| Species name                                       | Country                          | Local name                                     | Use           |
|----------------------------------------------------|----------------------------------|------------------------------------------------|---------------|
| <b>Cyanophyta</b>                                  |                                  |                                                |               |
| <i>Aphanothece sacrum</i>                          | Japan                            | -                                              | Food          |
| <i>Brachytrichia quoyi</i>                         | China                            | -                                              | Food          |
|                                                    | Japan                            | -                                              | Food          |
| <i>Chroococcus turgidus</i>                        | Mexico                           | <i>Cocol de agua</i>                           | Food          |
| <i>Nostoc coeruleum</i>                            | China                            | -                                              | Food          |
| <i>Nostoc commune</i>                              | Peru                             | <i>cusburo</i>                                 | Food          |
|                                                    | Japan                            | <i>kamagawa-nori</i>                           | Food          |
|                                                    | Java                             | <i>djamurbatu</i>                              | Food          |
|                                                    | Mongolia                         | -                                              | Food          |
|                                                    | Mexico                           | <i>amoxtle</i>                                 | Food          |
|                                                    | Bolivia                          | -                                              | Food          |
|                                                    | Ecuador                          | -                                              | Food          |
| <i>Nostoc commune</i><br>var. <i>flagelliforme</i> | China                            | <i>fa-ts'ai</i>                                | Food          |
| <i>Nostoc edule</i><br>= <i>pruniforme</i>         | China,<br>Mongolia, Soviet Union | -                                              | Soup          |
|                                                    | Peru                             | <i>cusburo</i>                                 | Food          |
| <i>Nostoc ellipsosporum</i>                        | Ecuador                          | -                                              | Food          |
| <i>Nostoc parmeloides</i>                          | Peru                             | -                                              | Food          |
| <i>Nostoc sphaericum</i>                           | Peru                             | <i>cusburo</i>                                 | Food          |
| <i>Nostoc verrucosum</i>                           | Peru                             | <i>cusburo</i>                                 | Food          |
|                                                    | Thailand                         | -                                              | Food          |
|                                                    | Japan                            | -                                              | Food          |
| <i>Nostoc</i> sp.                                  | Fiji                             | -                                              | Food          |
| <i>Nostochopsis lobatus</i>                        | China                            | -                                              | Food          |
| <i>Nostochopsis</i> sp.                            | Thailand                         | -                                              | Soup, dessert |
| <i>Oscillatoria</i> spp.                           | Java                             | <i>keklap</i>                                  | Food          |
| <i>Phormidium tenue</i>                            | Mexico                           | <i>cocol de agua</i>                           | Food          |
| <i>Phyloderma sacrum</i>                           | Japan                            | <i>suizenji-nori</i> ,<br><i>kotobuki-nori</i> | Food          |
| <i>Spirulina maxima</i>                            | Mexico                           | <i>tecuitlatl</i>                              | Food          |
| <i>Spirulina platensis</i>                         | Chad                             | <i>die</i>                                     | Sauce         |

19 druhů

Table II.C.1.2. (Continued)

| Species name                     | Country                 | Local name                                  | Use           |
|----------------------------------|-------------------------|---------------------------------------------|---------------|
| <b>Charophyta</b>                |                         |                                             |               |
| <i>Cbara</i> spp.                | Peru                    | -                                           | Food          |
| <b>Chlorophyta</b>               |                         |                                             |               |
| <i>Caulerpa</i> sp.              | New Caledonia           | -                                           | Baked, raw    |
|                                  | New Hebrides            | -                                           | Salad         |
|                                  | Polynesia               | <i>ltmu, ltmu</i>                           | Salad         |
| <i>Caulerpa peltata</i>          | Malaysia                | <i>lata</i>                                 | Salad         |
|                                  | Java                    | <i>lata</i>                                 | Salad         |
|                                  | Philippines             | -                                           | Salad         |
|                                  | Indonesia               | -                                           | Salad,        |
|                                  |                         |                                             | sweetmeat     |
| <i>Caulerpa racemosa</i>         | Malaysia                | <i>letato</i>                               | Dessert       |
|                                  | Philippines             | <i>araructp lat-lat</i>                     | Salad         |
|                                  | Indonesia               | -                                           | Raw,          |
|                                  |                         |                                             | sweetmeat     |
|                                  | Guam                    | <i>ltmu fuafua</i>                          | Relish        |
|                                  | Malaysia                | -                                           | -             |
| <i>Caulerpa serrulata</i>        | Malaysia                | -                                           | Food          |
|                                  | Celebes                 | -                                           | Food          |
|                                  | Singapore               | -                                           | Salad         |
|                                  | Philippines             | <i>gal galagac</i>                          | Food          |
| <i>Cbaetomorpba</i> sp.          | Malaysia                | <i>lumut laut</i>                           | Food          |
| <i>Cbaetomorpba antennina</i>    | Hawaii                  | <i>ltmu bututio, ltmu dlc, ltumumant</i>    | Food          |
|                                  |                         | <i>lumut-laut</i>                           | Raw           |
| <i>Cbaetomorpba crassa</i>       | Philippines             | <i>kauat-kauat</i>                          | Sweetmeat     |
| <i>Cbaetomorpba javanica</i>     | Indonesia               | <i>lumut laut</i>                           | Food          |
| <i>Cbaetomorpba tomentosum</i>   | Malaysia                | <i>susu-lopek, laur-laur</i>                | Raw           |
| <i>Cladophora</i> sp.            | Peru                    | -                                           | Food          |
| <i>Codium</i> sp.                | Philippines             | <i>pocpoco</i>                              | Salad         |
|                                  | Samoa                   | -                                           | Raw, baked    |
| <i>Codium fragile</i>            | Japan                   | <i>mtsu</i>                                 | Soup, sauce   |
|                                  | China                   | <i>stulsong</i>                             | Food          |
| <i>Codium intricatum</i>         | Philippines             | <i>pocpoco</i>                              | Salad, cooked |
|                                  |                         |                                             | vegetable     |
| <i>Codium muelleri</i>           | Hawaii                  | <i>ltmu aalaula</i>                         | Salad         |
|                                  | Philippines             | <i>pocpoco</i>                              | Salad         |
| <i>Codium papillatum</i>         | Philippines             | <i>pocpoco</i>                              | Salad, cooked |
|                                  |                         |                                             | vegetable     |
| <i>Codium tomentosum</i>         | Malaysia                | <i>susu-lopek, laur-laur</i>                | Raw           |
| <i>Enteromorpha</i> sp.          | China                   | <i>bu-rat</i>                               | Condiment     |
|                                  | Hawaii                  | <i>ltmu eleele</i>                          | Salad         |
|                                  | New Caledonia           | -                                           | Raw, baked    |
|                                  | Philippines             | <i>lumot</i>                                | Salad         |
|                                  | Northwest North America | -                                           | Food          |
| <i>Enteromorpha clathrata</i>    | China                   | <i>taitiao</i>                              | Food          |
| <i>Enteromorpha compressa</i>    | Malaysia                | -                                           | Food          |
|                                  | Philippines             | <i>lumot</i>                                | Salad         |
| <i>Enteromorpha flexuosa</i>     | Hawaii                  | <i>ltmu eleele</i>                          | Salad         |
| <i>Enteromorpha intestinalis</i> | Canada                  | -                                           | Food          |
|                                  | Malaysia                | -                                           | Food          |
|                                  | Philippines             | <i>lumot</i>                                | Salad         |
| <i>Enteromorpha plumosa</i>      | Philippines             | <i>lumot</i>                                | Salad         |
| <i>Enteromorpha prolifera</i>    | Hawaii, Malaysia, China | <i>ltmu eleele</i>                          | Salad         |
| <i>Enteromorpha tubulosa</i>     | China                   | <i>bu-rat</i>                               | Food          |
| <i>Monostroma</i> sp.            | Peru                    | -                                           | Soup          |
|                                  | China                   | <i>chiao-mo</i>                             | Condiment     |
| <i>Monostroma nitidum</i>        | China                   | -                                           | Condiment     |
| <i>Monostroma guaternaria</i>    | Peru                    | -                                           | Food          |
| <i>Oedogonium</i> sp.            | India                   | -                                           | Food          |
| <i>Prasiola japonica</i>         | Japan                   | <i>kawa-nori, datyagawa-nori, niko-nori</i> | Food          |
| <i>Prasiola yunnanica</i>        | China                   | -                                           | Food          |
| <i>Sprogyra</i> sp.              | Burma                   | -                                           | Food          |
|                                  | Canada                  | -                                           | Food          |
|                                  | Indochina               | -                                           | Food          |
|                                  | Thailand                | -                                           | Soup, salad   |

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*C. peltata**C. racemosa*



Table II.C.1.2. (Continued)

| Species name                    | Country                                              | Local name                     | Use                     |
|---------------------------------|------------------------------------------------------|--------------------------------|-------------------------|
| <b>Chlorophyta</b>              |                                                      |                                |                         |
| <i>Ullothrix flacca</i>         | China                                                | -                              | Vegetable               |
| <i>Ulva</i> sp.                 | China                                                | -                              | Food                    |
| <i>Ulva conlobata</i>           | Japan                                                | <i>auosa, aosa</i>             | Garnish                 |
| <i>Ulva fasciata</i>            | China                                                | -                              | Tea                     |
|                                 | Hawaii                                               | <i>limu pabapaba</i>           | Food                    |
|                                 | Peru                                                 | <i>cochayuyo</i>               | Food                    |
|                                 | China                                                | -                              | Tea                     |
| <i>Ulva lactuca</i>             | Canada (Bella Coola, Haida, Lillooet Indians)        | -                              | Food                    |
|                                 | Chile                                                | <i>luche</i>                   | Food                    |
|                                 | China                                                | <i>Hai ts'ai</i>               | Soup, salad, vegetable  |
|                                 | New Zealand (Maori)                                  | -                              | Soup, stew, vegetable   |
|                                 | Peru                                                 | <i>cochayuyo</i>               | Food                    |
|                                 | Philippines                                          | <i>gangamet</i>                | Salad, cooked vegetable |
| <i>Ulva lactuca</i>             | United States, California (Potomahd Kashoya Indians) | <i>sibtono</i>                 | Flavoring               |
|                                 | Hawaii                                               | <i>limu pakeaea</i>            | Soup, salad, garnish    |
|                                 | Washington (Makah)                                   | <i>kalkatsup</i>               | Food                    |
| <b>Phaeophyta</b>               |                                                      |                                |                         |
| <i>Alaria crassifolia</i>       | Japan                                                | <i>chigatso</i>                | Food                    |
| <i>Alaria esculenta</i>         | Alaska (Indian)                                      | -                              | Food                    |
|                                 | Siberia (Nivkhi)                                     | -                              | Food                    |
|                                 | Iceland, Ireland, Orkney Islands, Norway, Scotland   | -                              | Food                    |
| <i>Alaria pylatt</i>            | Greenland (Inuit)                                    | <i>kjfflasat</i>               | Food                    |
|                                 | Greenland (Angmagsalik)                              | <i>suvdlutst</i>               | Food                    |
|                                 | Siberia                                              | <i>me'gomet</i>                | Food                    |
| <i>Arthrocnemum bifidus</i>     | Japan                                                | <i>mekoasbi-kombu chigatso</i> | Food                    |
| <i>Arthrocnemum kurlenstis</i>  | Japan                                                | <i>chibitmanekoasbi</i>        | Food                    |
| <i>Ascophyllum nodosum</i>      | Greenland                                            | <i>miserarnat</i>              | Food                    |
| <i>Chomospora pacifica</i>      | Indochina                                            | <i>rau ngoat</i>               | Salad, relish           |
| <i>Chorda filum</i>             | China                                                | -                              | Food                    |
|                                 | Japan                                                | -                              | Salad                   |
| <i>Dictyopteris platygramma</i> | Hawaii                                               | <i>limu lipoa</i>              | Food                    |
| <i>Dictyopteris repens</i>      | Easter Island                                        | <i>auke</i>                    | Food                    |
| <i>Dictyota</i> sp.             | Indonesia                                            | -                              | Food                    |
| <i>Dictyota acutifolia</i>      | Hawaii                                               | -                              | Food                    |
| <i>Dictyota apiculata</i>       | Hawaii                                               | -                              | Food                    |
| <i>Durvillaea antarctica</i>    | Chile                                                | <i>cochayuyo</i>               | Stew                    |
|                                 | Peru                                                 | <i>cochayuyo</i>               | Food                    |
|                                 | New Zealand (Maori)                                  | <i>rimurapi</i>                | Roasted                 |
| <i>Ecklonia kurome</i>          | China                                                | <i>kunbu, mlangibat</i>        | Food                    |
| <i>Ecklonia stolonifera</i>     | Japan                                                | <i>kizame arame</i>            | Soup, sauce, stew       |
| <i>Eisenia bicyclis</i>         | Japan                                                | <i>aramé</i>                   | Soup, stew              |
| <i>Endarachne binghamiae</i>    | China                                                | -                              | Food                    |
| <i>Fucus</i> sp.                | Alaska (Chugach)                                     | -                              | Food                    |
|                                 | Greenland (Inuit)                                    | <i>mitkarkat</i>               | Food                    |
| <i>Heterocordaria abietina</i>  | Japan                                                | <i>matsumo</i>                 | Sauce                   |
| <i>Hizikia fusiforme</i>        | Japan                                                | <i>bijiki</i>                  | Soup, stew, salad       |
| <i>Hydroclatrus clatratrus</i>  | Philippines                                          | <i>balbalulang</i>             | Salad                   |
| <i>Isbige okamurai</i>          | China                                                | <i>tieding cai</i>             | Food                    |
| <i>Isbige stnicole</i>          | China                                                | <i>bat dat</i>                 | Food                    |
| <i>Kjellmaniella gyrata</i>     | Japan                                                | -                              | Soup                    |
| <i>Laminaria</i> sp.            | New Zealand                                          | <i>rimu roa</i>                | Roasted                 |
| <i>Laminaria angustata</i>      | Japan                                                | <i>kizami-kombu</i>            | Soup                    |
| <i>Laminaria cichoroides</i>    | Japan                                                | <i>chitimi-kombu</i>           | Vegetable               |
| <i>Laminaria diabolica</i>      | Japan                                                | <i>kuro-tororo</i>             | Food                    |
| <i>Laminaria digitata</i>       | Scotland                                             | <i>kombu</i>                   | Food                    |

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*U. conlobata**U. fasciata**U. lactuca*

Table II.C.1.2. (Continued)

| Species name                    | Country                           | Local name                                     | Use                     |
|---------------------------------|-----------------------------------|------------------------------------------------|-------------------------|
| <b>Phaeophyta</b>               |                                   |                                                |                         |
| <i>Laminaria japonica</i>       | Japan                             | <i>ma-kombu</i>                                | Sweetmeat               |
|                                 | Japan                             | <i>ori-kombu</i>                               | Food                    |
|                                 | China                             | <i>ba'rai</i>                                  | Food                    |
| <i>Laminaria digitata</i>       | Japan                             | -                                              | Food                    |
| <i>Laminaria ochotensis</i>     | Japan                             | <i>risbiri-kombu</i>                           | Food                    |
| <i>Laminaria religiosa</i>      | Japan                             | <i>bosome-kombu</i> ,<br><i>salmatsu-kombu</i> | Food                    |
| <i>Laminaria saccharina</i>     | France, Great Britain,<br>Ireland | -                                              | Fresh                   |
| <i>Laminaria yezoensis</i>      | Japan                             | -                                              | Food                    |
| <i>Macrocystus integrifolia</i> | British Columbia                  | -                                              | Food                    |
| <i>Mesoglossa crassa</i>        | Japan                             | <i>futo-mozuku</i>                             | Food                    |
| <i>Mesoglossa decipiens</i>     | Japan                             | <i>mozuku</i>                                  | Food                    |
| <i>Nemacystus decipiens</i>     | China                             | <i>balda</i>                                   | Food                    |
|                                 | Japan                             | <i>mozuku</i>                                  | Food                    |
| <i>Padina australis</i>         | Indonesia                         | <i>agar-agar</i> ,<br><i>daun-besar</i>        | Sweetmeat               |
| <i>Pelvetia stilliquosa</i>     | China                             | <i>lufiao cat</i>                              | Food                    |
| <i>Petalonia fascia</i>         | Japan                             | <i>bondawara</i>                               | Soup, sauce             |
| <i>Postelsia palmaeformis</i>   | California (Indian)               | <i>gaye</i>                                    | Food                    |
| <i>Sargassum</i> sp.            | China                             | <i>ba' ts'at</i>                               | Tea, soup               |
|                                 | Hawaii                            | <i>ltmu kala</i>                               | Food                    |
|                                 | Malaysia                          | -                                              | Food                    |
| <i>Sargassum agulifolium</i>    | Indonesia, Malaysia               | <i>arten wart</i>                              | Raw, cooked             |
| <i>Sargassum fusiformis</i>     | China                             | <i>chu-chiau ts'at</i>                         | Soup, vegetable         |
| <i>Sargassum granuliferum</i>   | Amboina                           | <i>arten-wart</i>                              | Raw, cooked             |
|                                 | Indonesia                         | -                                              | Raw, cooked             |
|                                 | Malaysia                          | -                                              | Raw, cooked             |
| <i>Sargassum hemiphyllum</i>    | China                             | -                                              | Food                    |
| <i>Sargassum bentsleyianum</i>  | China                             | -                                              | Food                    |
| <i>Sargassum boreri</i>         | China                             | -                                              | Food                    |
| <i>Sargassum pallidum</i>       | China                             | -                                              | Food                    |
| <i>Sargassum polycystum</i>     | Amboina                           | <i>arten barulu</i>                            | Raw                     |
|                                 | Moluccas                          | <i>agar-agar' kapean</i>                       |                         |
| <i>Sargassum stilliquosum</i>   | Malaysia                          | -                                              | Raw, cooked,<br>pickled |
|                                 | Philippines                       | <i>aragan</i>                                  | Raw, cooked             |
| <i>Scytosiphon lomentaria</i>   | China                             | -                                              | Food                    |
| <i>Turbinaria conoides</i>      | Celebes                           | <i>labi-labi</i>                               | Salad                   |
|                                 | Malaysia                          | -                                              | Pickle                  |
| <i>Turbinaria ornata</i>        | Malaysia                          | <i>agar-agar-ksong</i>                         | Pickle                  |
|                                 | Moluccas                          | <i>arten essong</i>                            | Raw, cooked             |
| <i>Undaria peterseniana</i>     | Japan                             | <i>wakame</i>                                  | -                       |
| <i>Undaria pinnatifida</i>      | China                             | -                                              | Food                    |
|                                 | Japan                             | <i>wakame</i>                                  | Food                    |
| <i>Undaria undartoides</i>      | Japan                             | <i>wakame</i>                                  | Food                    |
| <b>Rhodophyta</b>               |                                   |                                                |                         |
| <i>Agardhiella</i> sp.          | Philippines                       | <i>gulaman</i>                                 | Sweetmeat               |
| <i>Acanthopeltis japonica</i>   | Japan                             | <i>yutkiri</i>                                 | Food                    |
|                                 | Indonesia                         | -                                              | Vegetable               |
| <i>Acanthopora spicifera</i>    | Philippines                       | <i>culot</i>                                   | Salad, cooked           |
| <i>Abnfeltia concinna</i>       | Hawaii                            | <i>ltmu aktaki</i>                             | Salad, baked            |
| <i>Asparagopsis sanfordiana</i> | Hawaii                            | -                                              | Food                    |
| <i>Abnfeltia taxiformis</i>     | China                             | -                                              | Salad, stew             |
|                                 | Hawaii                            | <i>ltmu kobu</i>                               | Food                    |
| <i>Bangia fusco-purpurea</i>    | China                             | <i>bangmaocat</i>                              | Salad                   |
|                                 | Hawaii                            | -                                              | Soup                    |
| <i>Caloglossa adnata</i>        | Burma                             | -                                              | Raw, boiled             |
| <i>Caloglossa lepreurii</i>     | Burma                             | -                                              | Food                    |
| <i>Camptopora bymaeides</i>     | Japan                             | <i>yego-nori</i>                               | Food                    |
| <i>Carpopeltis flabellata</i>   | Japan                             | <i>kome-nori</i>                               | Garnish                 |
| <i>Catenella impudica</i>       | Burma                             | -                                              | Salad                   |
| <i>Catenella nipae</i>          | Burma                             | -                                              | Raw, cooked             |
| <i>Cbondria tenuissima</i>      | Hawaii                            | <i>ltmu oolu</i>                               | Food                    |
| <i>Cbondria elatus</i>          | China                             | -                                              | Food                    |
| <i>Cbondria ocellatus</i>       | China                             | -                                              | Food                    |
|                                 | Japan                             | <i>makuri-nori</i>                             | Food                    |
| <i>Corallopsis salticornia</i>  | Indonesia                         | <i>butung-buka</i>                             | Vegetable,<br>jelly     |



L. Japonica



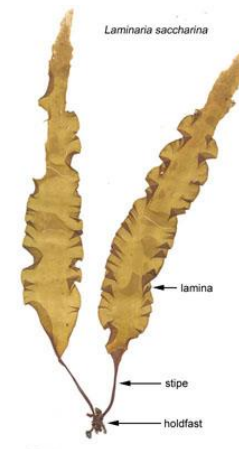
L. digitata



L. ochotensis



L. religiosa



L. saccharina



L. yezoensis

Table II.C.1.2. (Continued)

| Species name                       | Country     | Local name                     | Use                     |
|------------------------------------|-------------|--------------------------------|-------------------------|
| <b>Rhodophyta</b>                  |             |                                |                         |
| <i>Dermonema fraggleri</i>         | China       | -                              | Food                    |
| <i>Dermonema ouletnata</i>         | China       | -                              | Food                    |
| <i>Digenea simplex</i>             | Japan       | <i>makuri-nori</i>             | Food                    |
| <i>Eucheuma edule</i>              | China       | <i>bat-ts'at mu</i>            | Food                    |
|                                    | Indonesia   | <i>agar-agar-besar</i>         | Jelly                   |
| <i>Eucheuma gelatiniae</i>         | China       | -                              | Food                    |
| <i>Eucheuma borridum</i>           | Malaysia    | -                              | Jelly                   |
| <i>Eucheuma muricatum</i>          | Indonesia   | -                              | Jelly                   |
|                                    | Malaysia    | -                              | Agar                    |
|                                    | Philippines | <i>canot-canot</i>             | Salad, cooked vegetable |
| <i>Eucheuma serra</i>              | Bali        | <i>bulung</i>                  | Agar,                   |
|                                    |             | <i>djukui lallpan</i>          | vegetable               |
| <i>Eucheuma speciosa</i>           | Tasmania    | -                              | Jelly                   |
| <i>Gelidium acerosa</i>            | Philippines | <i>culot</i>                   | Salad, cooked vegetable |
| <i>Gelidium</i> sp.                | China       | <i>sbib-bua-isb</i>            | Agar                    |
|                                    | Hawaii      | <i>ltmu loloa</i>              | Food                    |
| <i>Gelidium amansii</i>            | Indonesia   | -                              | Jelly                   |
| <i>Gelidium latifolium</i>         | Hawaii      | -                              | Agar                    |
|                                    | Indonesia   | <i>ltmu loloa</i>              | Jelly                   |
|                                    | Java        | -                              | Agar                    |
| <i>Gelidium rigidum</i>            | Indonesia   | -                              | Jelly                   |
|                                    | Malaysia    | -                              | Agar                    |
| <i>Gigartina</i> sp.               | Malaysia    | -                              | Food                    |
|                                    | New Zealand | <i>rebta</i>                   | Food                    |
| <i>Gigartina chamissoi</i>         | Peru        | <i>cocbayuyo</i>               | Soup, stew              |
| <i>Gigartina glomerata</i>         | Peru        | <i>cocbayuyo</i>               | Soup, stew              |
| <i>Gigartina intermedia</i>        | China       | -                              | Food                    |
| <i>Gigartina leedii</i>            | Japan       | <i>cata-nori, sbibin-nori</i>  | Food                    |
| <i>Geloptetis</i> sp.              | China       | -                              | Soup                    |
| <i>Geloptetis coliformis</i>       | China       | -                              | Food                    |
| <i>Geloptetis furcata</i>          | China       | -                              | Food                    |
|                                    | Japan       | <i>funori</i>                  | Food                    |
| <i>Geloptetis tenax</i>            | Taiwan      | <i>funori</i>                  | Raw, fried              |
| <i>Gracilaria</i> sp.              | New Zealand | <i>karengo</i>                 | Food                    |
| <i>Gracilaria confertifolles</i>   | China       | <i>bat-metn-san</i>            | Food                    |
|                                    | Philippines | <i>gulaman</i>                 | Salad, cooked vegetable |
| <i>Gracilaria coronopifolia</i>    | Hawaii      | <i>ltmu mabauea</i>            | Food                    |
|                                    | Philippines | <i>caocooyan</i>               | Dessert                 |
| <i>Gracilaria crassa</i>           | Philippines | <i>susueidot-baybay</i>        | -                       |
| <i>Gracilaria eucheumoides</i>     | Philippines | <i>cavot-cavot</i>             | Raw, cooked             |
| <i>Gracilaria lichenoides</i>      | Amboina     | <i>atjar</i>                   | Pickled                 |
|                                    | Ceylon      | <i>cban, cbow-parst</i>        | Pudding                 |
|                                    | Hawaii      | <i>ltmu manaua</i>             | Soup, jelly             |
|                                    | India       | <i>confit-parst</i>            | Food                    |
|                                    | Malaysia    | -                              | Pickled                 |
| <i>Gracilaria salicornia</i>       | Philippines | <i>susueidot-baybay</i>        | Food                    |
| <i>Gracilaria taeniolides</i>      | Malaysia    | -                              | Food                    |
| <i>Gracilaria verrucosa</i>        | Philippines | <i>susueidot-baybay</i>        | Food                    |
| <i>Grateloupla affinis</i>         | Japan       | <i>kome-nori</i>               | Food                    |
| <i>Grateloupla doryphora</i>       | Peru        | <i>cocbayuyo</i>               | Food                    |
| <i>Grateloupla filicina</i>        | China       | -                              | Soup                    |
|                                    | Japan       | <i>mukade-nori</i>             | Food                    |
|                                    | Philippines | -                              | Jelly                   |
| <i>Grateloupla ligulata</i>        | China       | <i>bat-ts'at</i>               | Food                    |
| <i>Griffithsia</i> sp.             | Hawaii      | <i>ltmu moopuna-kana lipoa</i> | Food                    |
| <i>Gymnogongrus discipitnatis</i>  | Hawaii      | <i>ltmu vavaloti</i>           | Food                    |
| <i>Gymnogongrus flabelliformis</i> | Japan       | <i>okitsu-nori</i>             | Food                    |
| <i>Gymnogongrus vermicularis</i>   | Hawaii      | <i>ltmu vavaloti</i>           | Food                    |
| <i>Halymenia durvillae</i>         | Hawaii      | <i>ltmu lepeabina</i>          | Food                    |
|                                    | Philippines | <i>gayong-gayong</i>           | Salad, cooked vegetable |
| <i>Hypnea</i>                      | Indonesia   | -                              | Dessert                 |
| <i>Hypnea armata</i>               | Hawaii      | <i>ltmu buna</i>               | Food                    |

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*Gelidium amansii**Gelidium latifolium*



Table II.C.1.2. (Continued)

| Species name                     | Country                                 | Local name                      | Use                     |
|----------------------------------|-----------------------------------------|---------------------------------|-------------------------|
| <b>Rhodophyta</b>                |                                         |                                 |                         |
| <i>Hypnea cenomyce</i>           | Indonesia                               | -                               | Food                    |
| <i>Hypnea cernitcomis</i>        | China                                   | <i>sa ts'at</i>                 | Food                    |
| <i>Hypnea cbaroides</i>          | Philippines                             | <i>culot tipusa</i>             | Salad                   |
| <i>Hypnea ditvaricata</i>        | Amboina                                 | <i>arten</i>                    | Agar, food              |
| <i>Hypnea nidifica</i>           | Hawaii                                  | <i>ltmu buna</i>                | Food                    |
| <i>Hypnea musciformis</i>        | China                                   | <i>su-wet-tung</i>              | Stew, jelly             |
| <i>Iridea edulis</i>             | Iceland                                 | -                               | Food                    |
|                                  | Scotland                                | <i>dulse</i>                    | Food                    |
| <i>Laurencia</i> sp.             | Hawaii                                  | <i>ltmu lipeepee</i>            | Salad                   |
|                                  | Polynesia                               | <i>lum, (ltmu, rtmu)</i>        | Cooked                  |
| <i>Laurencia botryoides</i>      | Hawaii                                  | <i>tartaripitp</i>              | Raw, cooked             |
| <i>Laurencia okamura</i>         | Philippines                             | <i>culot</i>                    | Salad, cooked vegetable |
| <i>Laurencia papillosa</i>       | Hawaii                                  | <i>ltmu lipeepee</i>            | Cooked salad,           |
|                                  | Philippines                             | <i>culot</i>                    | cooked vegetable        |
| <i>Laurencia pinnatifida</i>     | Scotland, Western Europe, United States | <i>pepper dulse</i>             | Seasoning               |
| <i>Lemanea mamillata</i>         | India                                   | <i>nungham</i>                  | Food                    |
| <i>Liagora decussata</i>         | Hawaii                                  | <i>ltmu puak</i>                | Food                    |
| <i>Liagora farinosa</i>          | Philippines                             | <i>baris-baris</i>              | Food                    |
| <i>Macrocystis integrifolia</i>  | British Columbia                        | giant kelp                      | Food                    |
| <i>Nematolus belmontoides</i>    | Italy, Japan                            | sea noodles                     | Food                    |
| <i>Nematolus multifidus</i>      | Japan                                   | <i>tsukomo-nori</i>             | Food                    |
| <i>Nematolus vermicularis</i>    | Japan                                   | <i>umui-somen</i>               | Food                    |
| <i>Porphyra</i> sp.              | British Columbia                        | -                               | Food                    |
|                                  | New Zealand                             | <i>karengo</i>                  | Food                    |
| <i>Porphyra atropurpurea</i>     | Hawaii                                  | <i>ltmu luau</i>                | Condiment               |
|                                  | Philippines                             | <i>gamet</i>                    | Soup                    |
| <i>Porphyra columbina</i>        | Chile                                   | <i>luche</i>                    | Stew                    |
|                                  | Peru                                    | <i>cobayuyo</i>                 | Stew                    |
| <i>Porphyra crispata</i>         | China                                   | <i>tsu ts'at</i>                | Condiment, vegetable    |
| <i>Porphyra dentata</i>          | China                                   | -                               | Food                    |
| <i>Porphyra laciniata</i>        | California                              | -                               | Baked, raw              |
|                                  | Hebrides                                | -                               | Food                    |
| <i>Porphyra leucosticta</i>      | Hawaii                                  | <i>ltmu luau</i>                | Food                    |
|                                  | Peru                                    | <i>cobayuyo</i>                 | Stew                    |
| <i>Porphyra marginata</i>        | China                                   | -                               | Food                    |
| <i>Porphyra perforata</i>        | British Columbia                        | -                               | Food                    |
| <i>Porphyra suborbiculata</i>    | China                                   | <i>tsu-ts'at</i>                | Vegetable               |
| <i>Porphyra tenera</i>           | Japan                                   | <i>awanori</i>                  | Food                    |
| <i>Porphyra vulgaris</i>         | California                              | -                               | Baked, raw              |
| <i>Rhodoglossum palmata</i>      | Canada                                  | <i>sol</i>                      | Nibbled with beet       |
|                                  | Iceland                                 | <i>sol</i>                      | Cooked, baked           |
|                                  | Ireland                                 | -                               | Food                    |
| <i>Rhodoglossum denticulatum</i> | Peru                                    | -                               | Food                    |
| <i>Sarcodita</i> sp.             | Japan                                   | <i>bosaka-nori, atsuka-nori</i> | Food                    |
| <i>Sarcodita montagneana</i>     | Mollucas                                | -                               | Food                    |
| <i>Subria vittata</i>            | South Africa                            | -                               | Jelly                   |

# Vlastnosti a další využití sinic a řas

- Chaluhy jako hnojivo a krmivo pro zvířata – již celá staletí na farmách v Evropě (římské knihy ze 2 století n.l.), Středomoří, Severní Americe, Asii, biomasa chaluh byla zaoraná nebo usušena a spálená, popel použit jako hnojivo (doplňuje půdu o minerální látky), zvápenaté řasy slouží k obohacování půdy  $\text{Ca}^{2+}$
- Menstruační tampony – zejména chaluhy
- Mytí rukou – *Ulva* (Skotsko)
- Výplně spár mezi trámy srubů – *Ulva* (Skotsko)

Table II.C.1.3. The gross chemical composition of edible algae (percentage of dry weight)

| Species                          | Protein | Total carbohydrate<br>plus fiber | Lipids | Total<br>nucleic acids | Ash   | HO    |
|----------------------------------|---------|----------------------------------|--------|------------------------|-------|-------|
| <b>Cyanophyta</b>                |         |                                  |        |                        |       |       |
| <i>Agmenellum quadruplicatum</i> | 36      | 32                               | 13     | -                      | 11    | -     |
| <i>Nostoc commune</i>            | 21      | 60                               | 1      | -                      | 8     | 11    |
| <i>Nostoc phylloiderma</i>       | 25      | 59                               | 1      | -                      | 12    | -     |
| <i>Pbormidium tenue</i>          | 11      | 52                               | 1      | -                      | 46    | 9     |
| <i>Spirulina</i> sp.             | 64-70   | -                                | 5-7    | 4                      | -     | -     |
| <i>Spirulina maxima</i>          | 56-62   | 16-18                            | 2-3    | -                      | -     | -     |
| <i>Spirulina maxima</i>          | 60-71   | 13-17                            | 6-7    | 3-5                    | 6-9   | -     |
| <i>Spirulina platensis</i>       | 46-50   | 8-14                             | 4-9    | 2-5                    | -     | -     |
| <i>Spirulina platensis</i>       | 63      | 9                                | 3      | 4                      | 10    | 9     |
| <i>Synechococcus</i> sp.         | 63      | 15                               | 11     | 5                      | -     | -     |
| <b>Chlorophyta</b>               |         |                                  |        |                        |       |       |
| <i>Chlorella vulgaris</i>        | 52      | 25                               | 6      | -                      | 14    | 5     |
| <i>Chlorella vulgaris</i>        | 57      | 32                               | 6      | -                      | 8     | -     |
| <i>Coelastrum proboscideum</i>   | 49      | 24                               | 9      | -                      | 13    | 6     |
| <i>Enteromorpha</i> sp.          | 20      | 58                               | 0.3    | -                      | 15    | -     |
| <i>Enteromorpha compressa</i>    | 12      | -                                | -      | -                      | 10    | 14    |
| <i>Enteromorpha linza</i>        | 19      | -                                | -      | -                      | 19    | 14    |
| <i>Monostroma</i> sp.            | 20      | 5                                | 1      | -                      | 15    | -     |
| <i>Ulva</i> sp.                  | 26      | 46                               | 1      | -                      | 23    | -     |
| <i>Ulva</i> sp.                  | 15      | 51                               | -      | -                      | 16    | 19    |
| <b>Phacophyta</b>                |         |                                  |        |                        |       |       |
| <i>Artbrothamnus bifidus</i>     | 6       | 52                               | 0.7    | -                      | 17    | 24    |
| <i>Ascophyllum nodosum</i>       | 5-10    | 42-59                            | 2-4    | -                      | 17-20 | 12-15 |
| <i>Hizikia fusiformis</i>        | 6       | 102                              | 1.7    | -                      | 19    | 12    |
| <i>Hizikia fusiformis</i>        | 10      | 57                               | 0.5    | -                      | -     | 16    |
| <i>Kjellmaniella crassifolia</i> | 9       | 62                               | 0.6    | -                      | 28    | -     |
| <i>Laminaria</i> sp.             | 2       | 11                               | 0.6    | -                      | 7     | -     |
| <i>Laminaria</i> sp.             | 6       | 49                               | 1      | -                      | 21    | 24    |
| <i>Laminaria angustata</i>       | 9       | 65                               | 1.7    | -                      | 24    | -     |
| <i>Laminaria angustata</i>       | 9       | 66                               | 2.2    | -                      | 19    | -     |
| <i>Laminaria japonica</i>        | 9       | 68                               | 1.3    | -                      | 22    | -     |
| <i>Laminaria japonica</i>        | 9       | 66                               | 2.2    | -                      | 23    | -     |
| <i>Laminaria japonica</i>        | 4       | 88                               | 3      | -                      | 18    | 10    |
| <i>Laminaria religiosa</i>       | 8       | 67                               | 0.5    | -                      | 25    | -     |
| <i>Sargassum</i> sp.             | 5       | 35                               | 1.3    | -                      | 25    | 33    |
| <i>Undaria</i> sp.               | 3       | 10                               | 0.6    | -                      | 7     | -     |
| <i>Undaria pinnatifida</i>       | 12      | 38                               | 0.3    | -                      | 31    | 19    |
| <i>Undaria pinnatifida</i>       | 21      | 8                                | 1.7    | -                      | 31    | 19    |
| <b>Rhodophyta</b>                |         |                                  |        |                        |       |       |
| <i>Gelidium</i> sp.              | 13      | 68                               | -      | -                      | 4     | -     |
| <i>Gracilaria</i> sp.            | 4       | 28                               | -      | -                      | 4     | -     |
| <i>Gracilaria coronopifolia</i>  | 8       | 61                               | 0.1    | -                      | 18    | 13    |
| <i>Laurencia</i> sp.             | 9       | 62                               | 1      | -                      | 19    | 9     |
| <i>Palmaria</i> sp.              | 20      | 60                               | 1      | -                      | 13    | 7     |
| <i>Porphyra</i> sp.              | 44      | 46                               | 2      | -                      | 8     | -     |
| <i>Porphyra laciniata</i>        | 29      | 41                               | 2      | -                      | 19    | 9     |
| <i>Porphyra tenera</i>           | 29-36   | 39-41                            | 0.6    | -                      | -     | 11-13 |
| <i>Porphyra tenera</i>           | 46      | 64                               | 0.5    | -                      | 12    | 9     |
| <i>Porphyra tenera</i>           | 28      | 40                               | 0.8    | -                      | 10    | 17    |
| <i>Rhodomenia palmata</i>        | 8-35    | 38-74                            | 0.2-4  | -                      | 12-37 | -     |

# Živiny v řasách

# Biotechnologie sinic a řas

od přírodních populací ke kulturám a  
produktům



Řasa – přírodní  
populace



Přímé  
zpracování na  
finální produkt



Izolace a kultivace

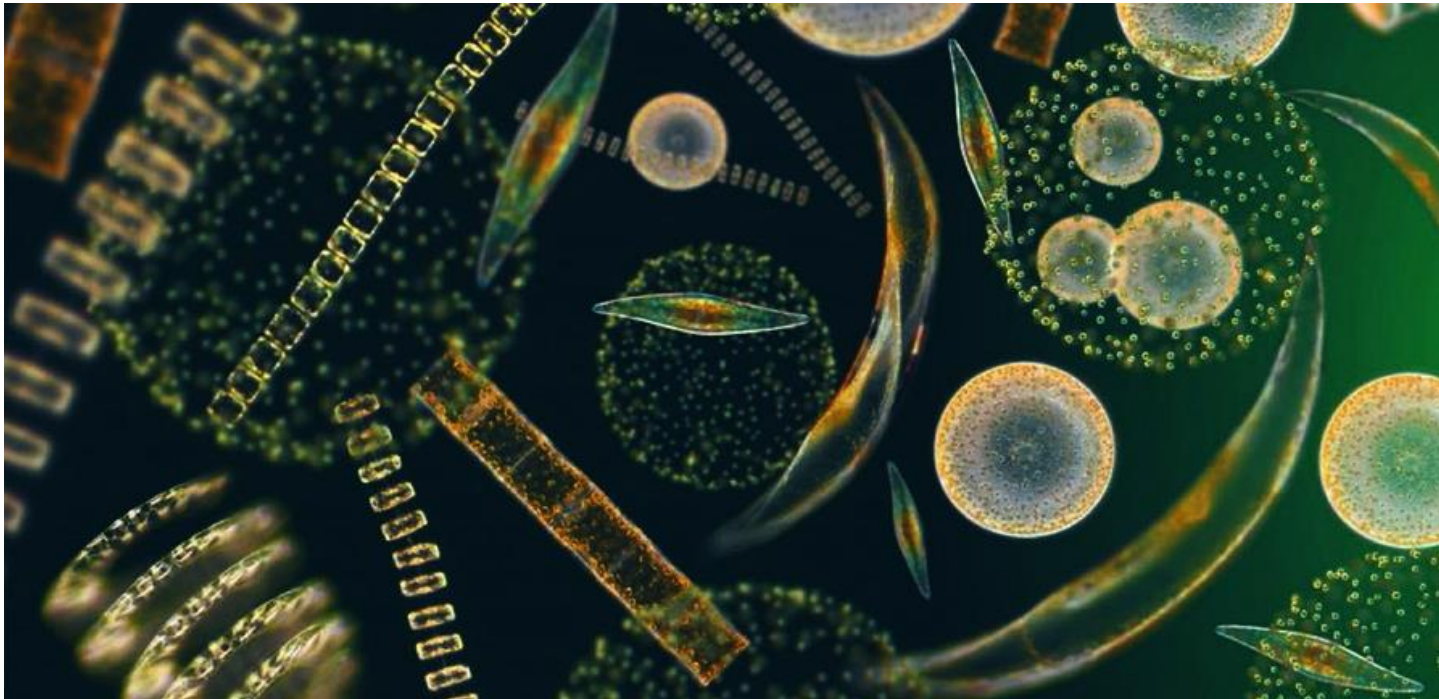
Zpracování na produkt



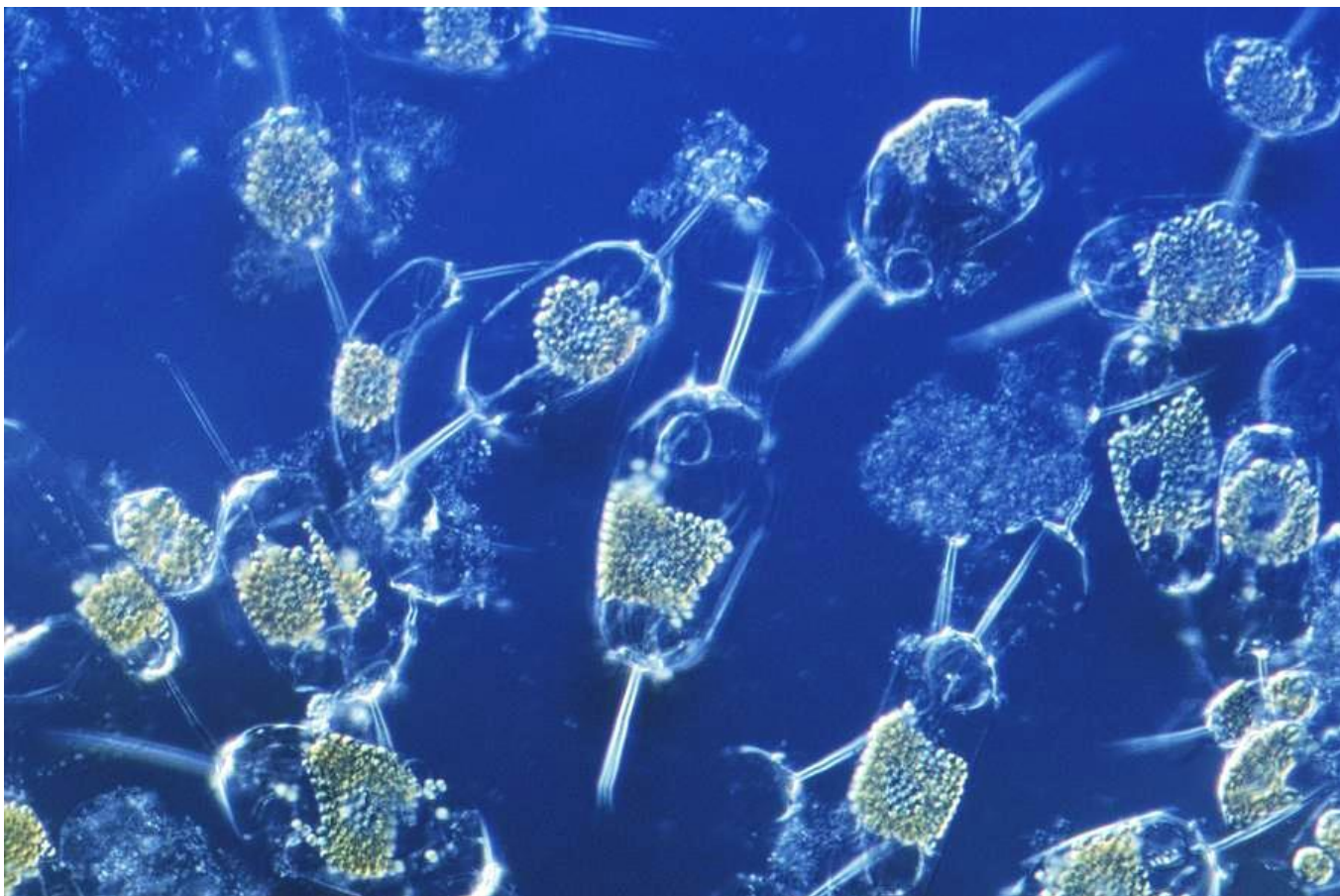
Ostatní využití v akvakultuře



# Přírodní populace jako zdroj materiálu řas pro biotechnologie

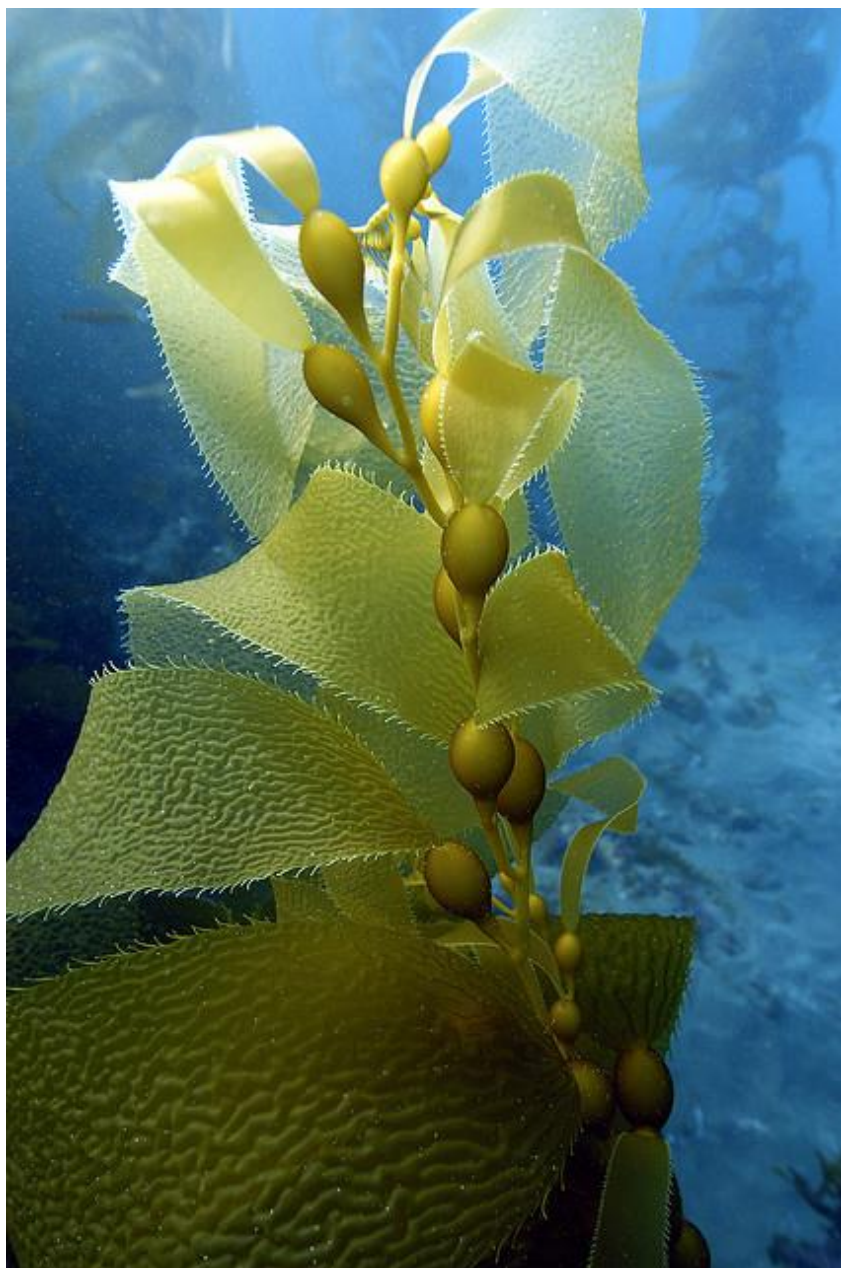


Fytoplankton – aktivně či pasivně se vznášející sinice a řasy ve vodním sloupci



Mořský fytoplankton – významný primární producent na Zemi, vysoký biotechnologický potenciál

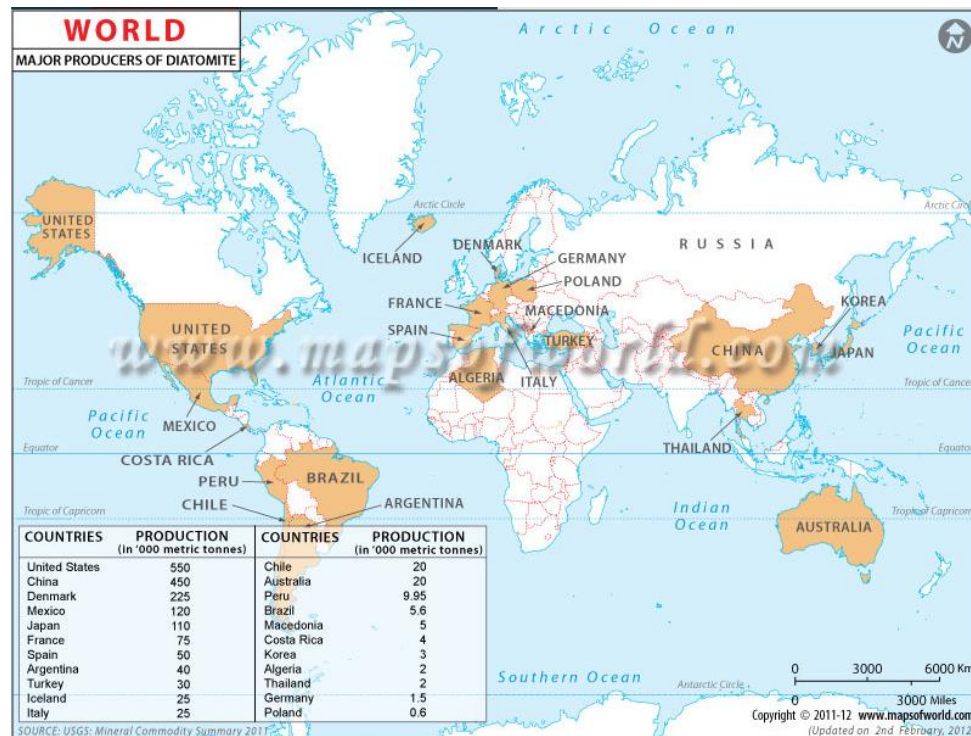




Chaluhy –  
Makroskopické hnědé řasy v  
litorálních zónách moří a oceánů

# Přímé zpracování řas nebo jejich částí na produkt

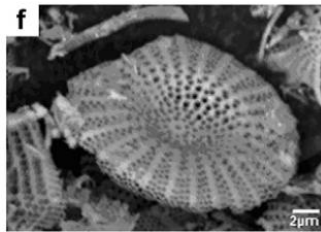
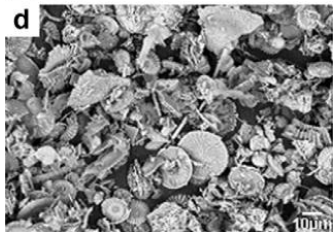
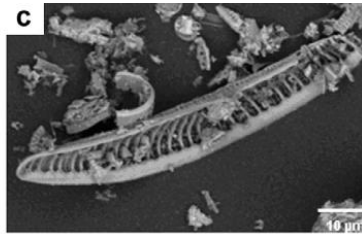
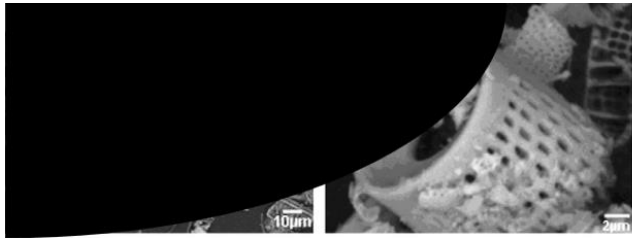
A. Diatomit – přírodní produkt, sedimentární hornina



Description : The map showing major Diatomite Producing Countries in World.

Disclaimer

# Vrstvy diatomitu

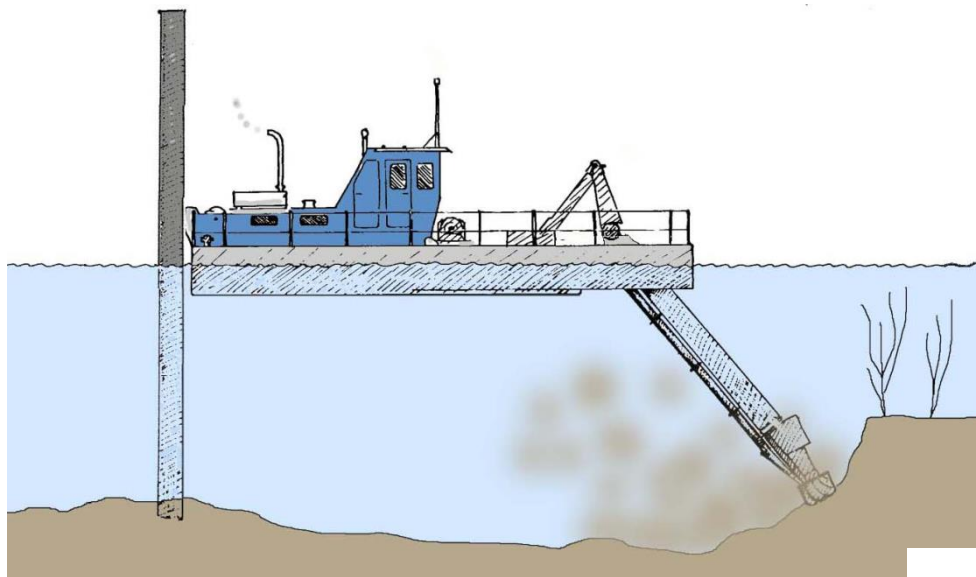




# Těžba diatomitu



# Těžba diatomitu

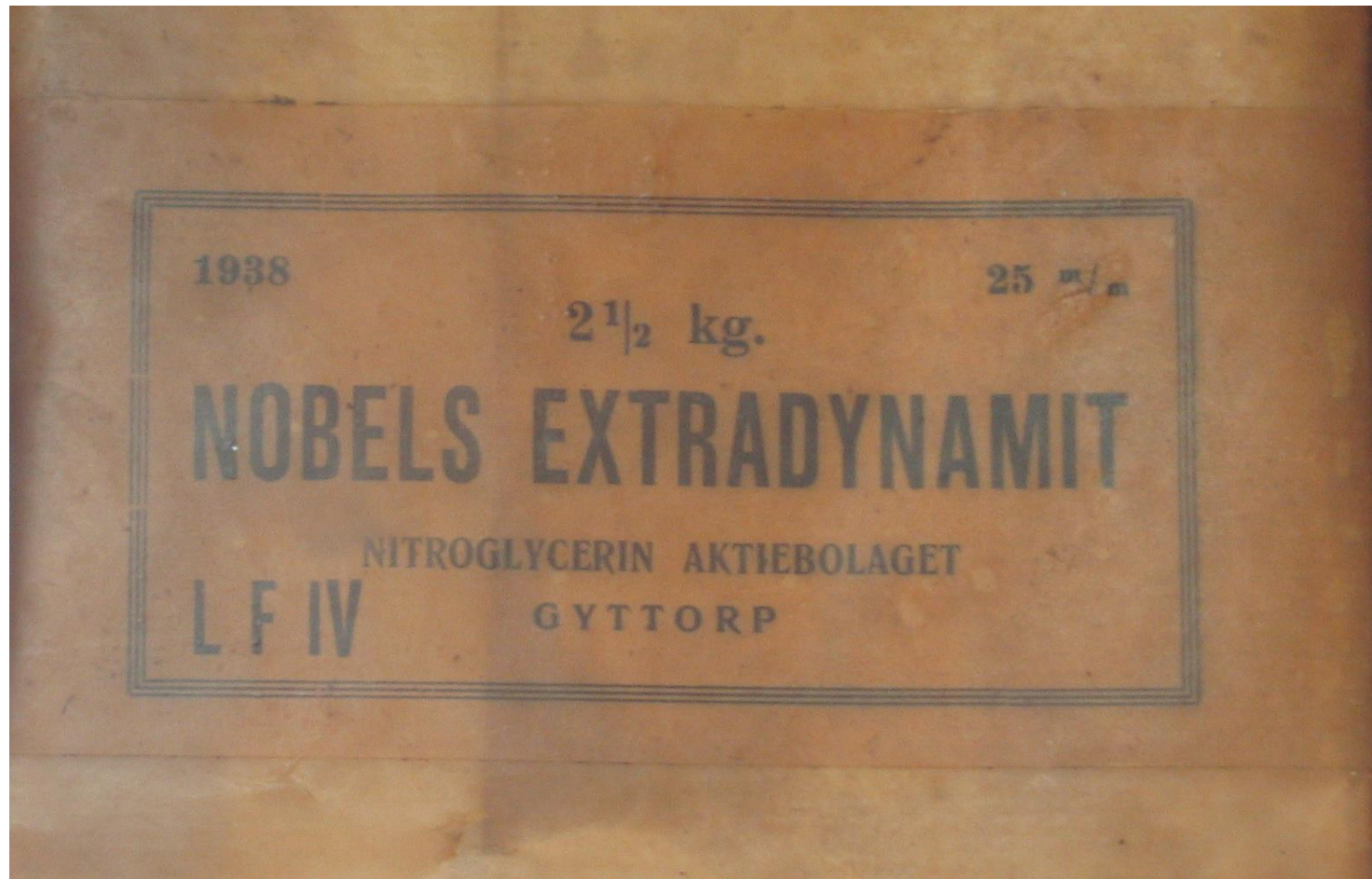




# Zpracování diatomitu



# Dynamit





# Nobelova cena

**Nobelova cena** je ocenění každoročně udělované za zásadní **vědecký** výzkum, **technické** objevy či za přínos lidské společnosti. Uděluje se v následujících oborech: **fyzika**, **chemie**, **fyzilogie** nebo **lékařství**, **literatura**, **mír**; dále se také uděluje **Cena Švédské národní banky za rozvoj ekonomické vědy na památku Alfreda Nobela**, běžně označovaná jako „Nobelova cena za ekonomii“, která však není skutečnou Nobelovou cenou (viz níže).

Nobelova cena je udělována každoročně od roku 1901 na základě **poslední vůle švédského** vědce a průmyslníka **Alfreda Nobela**, vynálezce **dynamitu**. Ve všech oblastech, v nichž je udělována, je považována za nejprestižnější ocenění.

**Obsah** [skrýt]

1

Oceňované oblasti

2

Udělování cen

3

Obsah ceny

4

Vybraní laureáti

4.1

Vícenásobní nositelé

4.2

Čeští nositelé

4.3

Nositelé pocházející z Česka

5

Oceněné ženy

6

Ceny v ostatních oborech

7

Reference

8

Externí odkazy



## Oceňované oblasti [ editovat | editovat zdroj ]

Alfred Nobel ve své závěti napsal, že z jeho pozůstalosti mají být každoročně udělovány ceny za vynikající činy v pěti oblastech lidské činnosti:

- Nobelova cena za fyziku – udělována švédskou Královskou akademií věd
- Nobelova cena za chemii – udělována švédskou Královskou akademií věd
- Nobelova cena za fyziologii nebo lékařství – udělována institutem Karolinska
- Nobelova cena za literaturu – udělována Švédskou akademií
- Nobelova cena za mír – udělována komisí norského parlamentu

Roku 1968 se Švédská národní banka rozhodla založit Nobelovu cenu za ekonomii, pod názvem „Cena Švédské národní banky za rozvoj ekonomické vědy na památku Alfreda Nobela“. Tuto cenu uděluje švédská Královská akademie věd, ale jelikož není zmíněna v Nobelově závěti, peněžní odměna se nevyplácí z Nobelova fondu, a nejedná se tedy o „Nobelovu cenu“.<sup>[1]</sup> Přesto se uděluje společně s ostatními cenami. V roce 1968 však bylo rozhodnuto, že žádné další ceny „na památku Alfreda Nobela“ již zaváděny nebudou.

# Filtr na výrobu piva



# Další filtrační zařízení

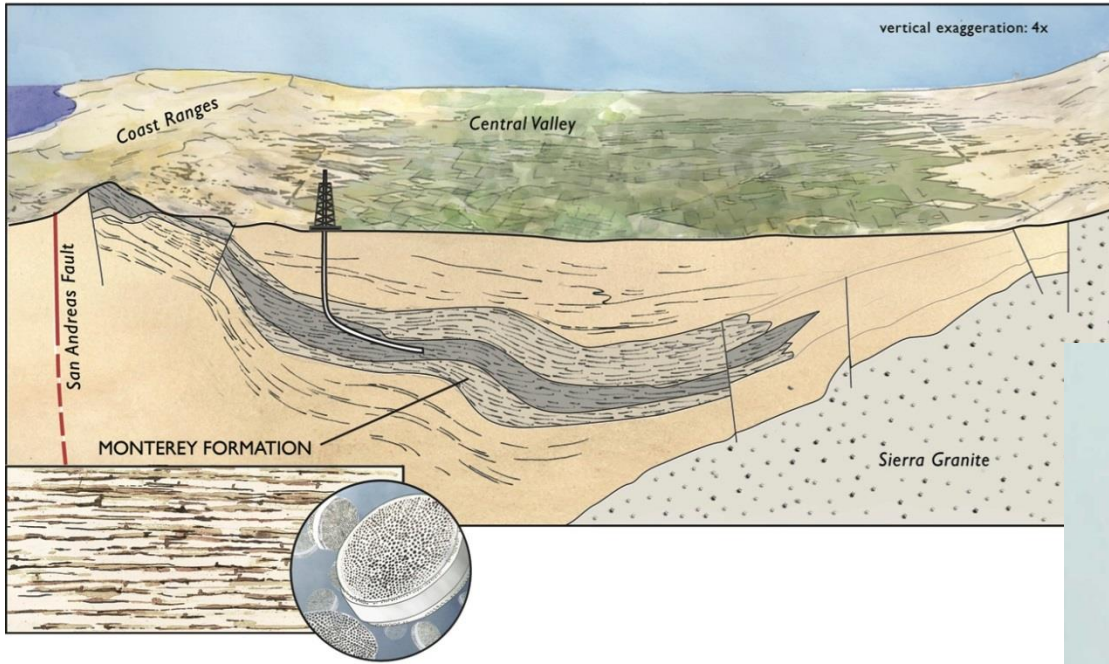


# Zachytávače kouře a prachu





# Vrstvy diatomitu a ropa



# Přímé zpracování řas nebo jejich částí na produkt

B. Agar – jméno pochází z malajštiny agar-agar, označení ruduchy *Eucheuma muricatum*



# Historie agaru

- Objev agaru 1658 Minoya Tarozaemon (Japonsko, Kanten – studené počasí)
- 1859 Anselme Payen – extrakce agru z ruduchy *Gelidium corneum*
- 1882 použití agaru v mikrobiologii – laboratoř prof. Kocha; reálný objev Angelina Fannie Eilshemius Hesse, manželka dr. Walthera Hesse, který pracoval v laboratoři Kocha

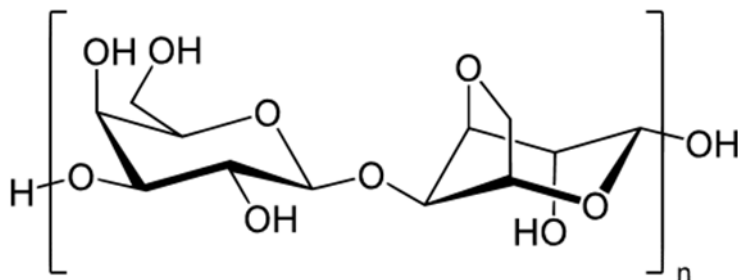
# Základní data

- Bod tání 85 °C
- Bod tuhnutí 32-40 °C
- Podle amerického lékopisu – suchá hydrofilní koloidní látka izolovaná z *Gelidium cartilagineum*, *Gracilaria confervoides* a příbuzných ruduch.
- Surový agar - jehlicovitý, složený z jemných membranosních proužků, vločkovitých nebo granulosních struktur
- Barva žlutavá, oranžová, našedlá nebo bezbarvá
- Práškový – bílý až žlutavý, nerozpustný ve studené vodě



# Existuje pouze jeden agar?

- Chemická struktura agaru závisí na zdroji a způsobu přípravy
- Meer (1980) rozlišuje dva typy agarů, *Gelidium* a *Gracilaria* agary, *Gelidium cartilagineum* – pobřeží Mexika, standardní bakteriologický agar v USA.
- Agar se skládá ze dvou složek – agarosa a agaropektin



# Vlastnosti agaru, typ *Gelidium*

- Připravený má podobu gelu, elastickému koloidu, který zaujímá tvar, ve kterém byl vyrobený.
- Gel může obsahovat až 99,9% vody, při této koncentraci může agar vodu uvolňovat v podobě kapek. Vodu lze odstranit opakovaným zmrazením a rozpuštěním.
- Tuhost agaru je dána strukturou – v gelu vznikají dvojité šroubovice agaros, které vytváří síť a na jeden díl agarosy může obsahovat až 100 dílů vody

# Schéma agarosové sítě



# *Gelidium corneum*





# *Gelidium corneum*



# Vlastnosti agaru, typ *Gracilaria*

- Z produkce 30 tis tun *Gracilaria* cca 5 tis tun agaru
- Agar není zcela stejný a mezi druhy mohou být jeho vlastnosti mírně odlišné, např. druhy *Gracilaria* z mírného pásu poskytují agar s vyšší pevností než druhy z tropů, důvod? – delší doba růstu a delší čas na tvorbu biomolekul = větší biomolekuly



# *Gracilaria chilensis*











# Zjednodušený postup extrakce agaru z rodu *Gracilaria*

- Čištění a separace čerstvé hmoty od příměsí
- Vysušení sběru
- Sběr sušené hmoty do pytlů a převoz ke zpracování
- Kontrola čistoty, udává se v % nečistot a % vlhkosti
- Ošetření před extrakcí:
  - ✓ bělení – opakované namáčení a sušení na slunci
  - ✓ Bělení pomocí vápence – zvýšení pevnosti agaru
  - ✓ Ošetření hydroxidem (NaOH) – zvýšení pevnosti a snížení viskozity agaru, 3-5% NaOH, 95 °C, 60-90 min

# Vlastní extrakce agaru

- Namočit vzorek na 30 min do kys.octové, pH 5,6-6
- Promýt vzorek a zahřát v drtiči na 1h, 95 °C
- Přemístit vzorek do míchačky, zahřívát 3h
- Přelit vzorek do tlakového filtru 50-80 psi
- Přefiltrovanou hmotu napustit na hliníkové pláty a nechat vychladnout v pokojové teplotě
- Tuhý agar na polyesterové síto a pak promývání vodou do bezbarvé formy, poté destilovanou vodou, nakonec isopropanol
- Odstředit isopropanol a roztrhaný vločkovitý agar se přemístí na hliníkovou pánev a zahřívá se na 55-60 °C
- Suchý agar se rozemele na jemný prášek



Sušení agaru v přístavu





Transport v pytlích



Skladiště ruduch ve výrobě agaru

pressure  
filters →



— hydraulic  
press

Tlakový filtr

# Využití agaru

- V roce 1989 pouze 5% světové produkce v mikrobiologii

Příklady použití v potravinářství

- Zmrzlina 0,2-0,5%, stabilizace a zabraňuje přilnutí k obalu
- 0,5-1% zabraňuje lámavosti polevy na koblize, zvyšuje přilnavost a snižuje roztékání
- Přísada do nízkokalorického pečiva, 0,1-1 %, zvětšení objemu
- Do želatinových bonbonů, 0,3-1,8%,
- 0,5-2% pomáhá zlepšovat barvu masných produktů, kuřata, ryby
- Do 1,5% zabraňuje vysychání omáček
- Zlepšuje vlastnosti polevy u sušenek

# Yokan

- Agar 1%
- Voda 26,5%
- Cukr 54,3%
- Sůl 0,2%
- Rozmačkané fazole 5,6%
- Další pevné látky 12,4%





# Oblate – jedlý papír

- Směs škrobu a agaru
- 100 dílů 5% škrobu
- 200 dílů 2,5% agaru



# Vanilková zmrzlina

- Agar 2,6g
- Vanilka 0,2g
- Uhličitan sodný 0,1g
- Barvivo 0,05g
- Mléko 500ml

# Další použití agaru

- Výroba hmot pro otisky zubů
- Medicína a farmacie
- Čištění piva a vína
- Výroba pevných podpalovacích kostek z alkoholu
- Barevné potahy papíru, kovů a látek
- Snižování citlivosti roznětek u výbušnin
- Kosmetika
- Výroba agarosy

# Seaweeds

- Makroskopické mořské řasy ze skupiny – ruduch, chaluh a zelených řas
- V Japonsku kombu (hlavně chladné vody, *Laminaria*), wakame (*Undaria*), nori (*Porphyra*)
- Anglicky mluvící země: Wrecks (typ *Fucus*), kelp (typ *Laminaria*)
- Jednoletky/víceleté druhy, kalcifikované typy až 100 let



# *Laminaria digitata*



doris.fresqui.fr © Catherine DUPRÉ

# *Macrocystis pyrifera*





# *Fucus vesiculosus*





# *Saccharina japonica*





# *Chondrus crispus*





# *Porphyra umbilicalis*





# *Caulerpa sertularioides*





# *Codium fragile*





# Sea Sure Annual Health Kit for Septic Tanks



[Click to zoom](#)

Septic tanks require ongoing care if expensive and unpleasant complications and breakdowns are to be avoided. After all, the bacteria population within a septic tank, which is crucial to its proper functioning, tends to diminish over time, either from irregular water flow or from the influx of anti-bacterial products, such as bleach or other detergents. When this population starts to wane, expensive and unpleasant blockages and smells become more likely. Compared to the cost of emergency pumping or plumbing work, which can often run into hundreds of pounds, a regular maintenance programme for your septic tank can be a very wise investment indeed.

Our *Sea Sure Annual Health Kit* offers unbeatable protection against septic tank problems by regularly topping up the bacteria within your system. It does this by combining fresh bacteria spores (BioBoost Tablets) with a special natural tonic (Sea Sure) made from *Ascophyllum nodosum* seaweed, which stimulates and supports the new microbes, giving them everything they need to multiply when they get in the tank.

Each *Sea Sure Annual Health Kit* comprises one litre of Sea Sure and twelve BioBoost Tablets. Once a month, measure out around 500ml of warm water in a jug or bucket and pour in approximately 80 ml of Sea Sure. Take one BioBoost Tablet out of the handy re-sealable tube and flush into your septic tank via a connected toilet.

## Details

SKU  
Quantity in stock  
Weight  
Seaweed ingredients

SKU4115  
50 item(s) available  
1.50 kg  
[Ascophyllum nodosum](#)

**Our price:**

**\$52.00**



# Sea Clean Industrial Oil Remover (5 Litres)



[Click to zoom](#)

**Versatile Cleaning Product:** *Sea Clean Industrial Oil Remover* is ideal for cleaning floors prior to the application of coatings, seals and other finishes, or for safely dealing with oil or fuel spills before they can become a major health and safety issue. It is suitable for use on a range of surface types, including concrete, metals, plastics and ceramics.

**Extremely Low Risk:** *Sea Clean Industrial Oil Remover* has no caustic alkalis, silicates, phosphates, harmful solvents or aggressive biocides, which makes it extremely low-risk to handle and store on site, posing no threat to employee health. It's not flammable, can be handled without gloves and does not need to be stored in a bonded warehouse.

**Environmentally Sound:** *Sea Clean Industrial Oil Remover* is derived from sustainably harvested British *Laminaria digitata* seaweed stocks and reinforced with other organic plant extracts. It is therefore an environmentally responsible option for business, posing no threat to the local eco-system whatsoever.

## Details

|                     |                                    |
|---------------------|------------------------------------|
| SKU                 | SKU411621                          |
| Quantity in stock   | 50 item(s) available               |
| Weight              | 5.50 kg                            |
| Seaweed ingredients | <a href="#">Laminaria digitata</a> |

**Our price:** **\$67.00**





[Click to enlarge](#)

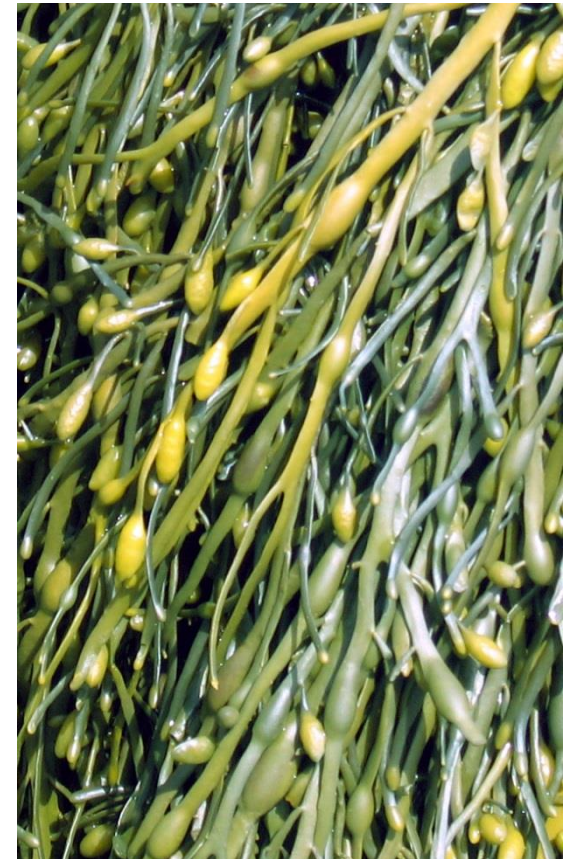
**Price:** \$13.50  
**Availability:** In Stock  
**Model:** UPC22632  
**Average Rating:** Not Rated

**Available Options:**

Additional Sizes:

Please Choose... ▼

Qty:  [Add to Cart](#)



**Description**

**Additional Images (1)**

**Reviews (0)**

**Related Products (0)** Sea Rose Fertilizer (2-1-2)

Sea Rose is a custom fertilizer for roses developed at the request of professional growers. Sea Rose begins with a base of our Seaweed/Fish fertilizer. To this we add black strap molasses and various vitamin supplements. Additionally, we add sulphur as both a nutrient source and to help control black spot and other fungal disorders. Sea Rose stimulates bud development, creates longer bloom cycles and brings out more vivid color.

Sea Rose is mixed a rate of 3 Tbsps. per gallon of water and applied as a foliar spray every 1 to 3 weeks during the growing season.



# PVFS Organic Liquid Kelp (Gallon) - F1331



Plant Nutrition

\$19.99

1

Add to Cart

Wishlist

- Qualifies for \$11.99 per package flat rate shipping in the Continental US.
- In stock. Ships from our warehouse in Northern California.

3 Reviews | [Add Your Review](#)

**Buy big, save big with quantity discounts**

Buy 10 for \$15.99 each and **save 21%**

**NOT ORGANIC**



Our supplier has submitted to us a letter of compliance with the National Organic Program which means this product should be suitable for use in organic agriculture, however an organic input review board has not verified these claims. Please confirm that the product is allowed by your certifying agency.

We do our best to update our product's organic status, however the status of any product can change at anytime without notice from the manufacturer. Please confirm that the product is allowed by your certifying agency and that it's still on CDFA's organic input material list at [cdfa.ca.gov](http://cdfa.ca.gov)



Description

Details

Reviews

Articles

Support

Cold-processed liquid kelp. Enzymatically digested, concentrated liquid extract of California Bull Kelp (*Nereocystis luetkeana*), harvested from kelp beds in the Pacific Ocean off the Northern coast of California. Freshly harvested kelp is rapidly processed at low temperatures, using naturally occurring enzymes isolated from the kelp, to digest and liquify the chopped kelp into a dark liquid extract.

This cold water enzymatic process preserves all the very important hormones, auxins, gibberellins, enzymes, proteins, vitamins and minerals found in Bull Kelp, which is internationally recognized for its high concentration of active



## bar soap

---

FRESH FIG

GREEN TEA

HONEY SHEA BUTTER

MINI BAR SOAP SET

WHITE TEA

WILD BANANA VANILLA

---



Contains: Green Tea, Fig and Sea Kelp

This highly aromatic bar soap, contains sea kelp to help exfoliate and give an invigorating glow to the skin, while drenching the body in the anti-oxidant benefits of green tea, all beautifully wrapped in a gorgeously scented bar of fresh fig and pomegranate

Directions: Use daily. Work up lather. Rinse well.

Suggested U.S. Retail Price:

6.4 oz / 180 g - **\$4.99 each**

**Ingredients:** Sodium Palmate, Sodium Cocoate, Water, Glycerin, Botanical Fragrance, Macrocystis Pyrifera (Sea Kelp) Extract, Ficus Carica (Fig) Extract, Lotus Corniculatus (Lotus Seed) Extract, Camellia Sinensis (Green Tea) Leaf Extract, Titanium Dioxide, and Sodium Chloride



## Apple Cider Vinegar Shampoo 12.0 oz

Apple Cider Vinegar Shampoo is formulated to increase the blood flow to the scalp while helping to balance the pH of the hair and scalp. Perfect for ALL hair types.

[Ask a question about this product](#)

[g+](#) 7

[Like](#) 27

[Tweet](#) 3

[Pinterest](#) 33

Price:

**\$29.00**

Size

12.0 oz ▼

1 + -

[Add to Cart](#)

Description

Ingredients

Multi Use

Pet Use

Reviews

Product Video

- Water (Aqua)
- Raw Apple Cider Vinegar (Acetic Acid)
- Aloe Vera (Aloe Barbadensis)
- Soapbark Extract (Quillaya Saponaria)
- Green Tea (Thea Sinesis Saponin)
- Naturally Foaming Cactus (Opuntia Erinacea)
- Blood of the Dragon Rare Proteins (Jatropha Dioica)
- Brown & Red Algae (Algae Macrocystis Purifera)
- Kelp
- Essential Oils of Almond (Amygdalus Communis), Ginger (Zingiber Afficinale), Sesame (Sesamum Indicum), and Tangerine (Citrus Reticulata)
- Trace Minerals and Rare Plant/Marine/Fruit Proteins as Natural Preservatives



## Pepper Dulse Butter

A lovely treat made from organic Welsh Butter, Pepper Dulse and Spices.

Pepper Dulse is a seaweed found along our coasts which has an exquisite peppery / Truffle like flavour. Try a little with your oven baked fish or pan fried shellfish, or mixed with hot pasta!

Pepper dulse butter is pepper dulse which has been cooked in welsh organic butter and then very lightly spiced. Fresh pepper dulse packs a huge amount a flavour which we capture in this product. This is only used on special occasions in the beach shack as the seaweed is difficult to harvest growing in small strands at low tide but it is very lovely and worth the effort!

Ingredients: pepper dulse, welsh organic butter, salt, smoked paprika, white pepper

No artificial ingredients or preservatives

Allergens: contains seaweed, Milk

Jar Details

100ml – Bio-plastic

This product is supplied chilled

Store in a refrigerator for up to 10 days

Once opened we recommend that you eat within 4 days

Please note that this product is only suitable for postage in the UK and Europe.

£3.90

Qty:



*Osmundea pinnatifida*



# Biopaliva



Bionafta  
Biobutanol  
Biobenzin  
Methan  
Ethanol

*Ankistrodesmus* TR-87: 28–40% dry weight

*Botryococcus braunii*: 29–75% dw

*Chlorella* sp.: 29%dw

*Chlorella protothecoides*(autotrophic/  
heterothrophic): 15–55% dw

*Cryptocodinium cohnii*: 20%dw

*Cyclotella* DI- 35: 42%dw

*Dunaliella tertiolecta* : 36–42%dw

*Hantzschia* DI-160: 66%dw

*Nannochloris*: 31(6–63)%dw

*Nannochloropsis* : 46(31–68)%dw

*Neochloris oleoabundans*: 35–54%dw

*Nitzschia* TR-114: 28–50%dw

*Phaeodactylum tricornutum*: 31%dw

*Scenedesmus* TR-84: 45%dw

*Schizochytrium* 50–77%dw

*Stichococcus*: 33(9–59)%dw

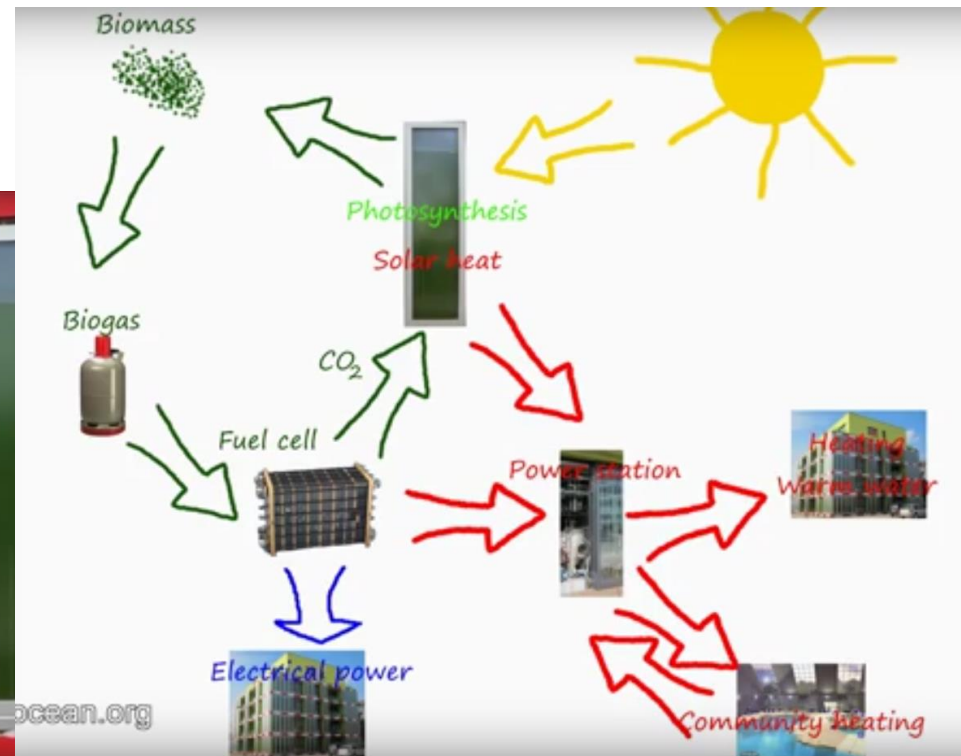
*Tetraselmis suecica*: 15–32%dw

*Thalassiosira pseudonana*: (21–31)%dw

# Biodiesel



## A modern, multi-story building with a green and white facade and red and white striped accents, featuring large glass windows and balconies. The building is a cube-like structure with a green top section and a white body with green vertical accents. Red and white striped horizontal bands separate the floors. Large glass windows and balconies are visible on each floor. The building is situated on a street with a blue sky and a few cars in the background. The text 'mocean.org' is visible in the bottom left corner.





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## SHARE



SHARE



TWEET

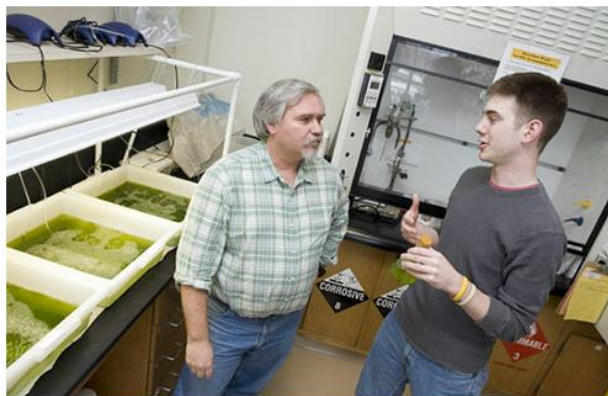


COMMENT



EMAIL

CHUCK SQUATRIGLIA GEAR 02.18.11 07:00 AM

USING ALGAE TO CLEAN  
WASTEWATER, MAKE FUEL

A wastewater treatment plant might seem like the last place to find a fuel for the future, but a team of researchers has done just that.

Researchers at Rochester Institute of Technology are using algae grown in wastewater to produce biodiesel. They say the process is "doubly green" because the algae consume

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## MOST POPULAR



BUSINESS

Google's New AI Head Is So  
Smart He Doesn't Need AI  
TOM SIMONITE



SCIENCE

The Feathers of Planet  
Earth's Bird of Paradise  
Literally Eat Light  
MATT SIMON



SECURITY

Why So Many People Make  
Their Password 'Dragon'  
LOUISE MATSAKIS

# Coastal Water Pollution

## Industry

Nitrogen oxides from autos and smokestacks; toxic chemicals, and heavy metals in effluents flow into bays and estuaries.

## Cities

Toxic metals and oil from streets and parking lots pollute waters; sewage adds nitrogen and phosphorus.

## Urban sprawl

Bacteria and viruses from sewers and septic tanks contaminate shellfish beds and close beaches; runoff of fertilization from lawns adds nitrogen and phosphorus.

## Construction sites

Sediments are washed into waterways, choking fish and plants, clouding waters, and blocking sunlight.

## Farms

Run off of pesticides, manure, and fertilizers adds toxins and excess nitrogen and phosphorus.

## Red tides

Excess nitrogen causes explosive growth of toxic microscopic algae, poisoning fish and marine mammals.

## Toxic sediments

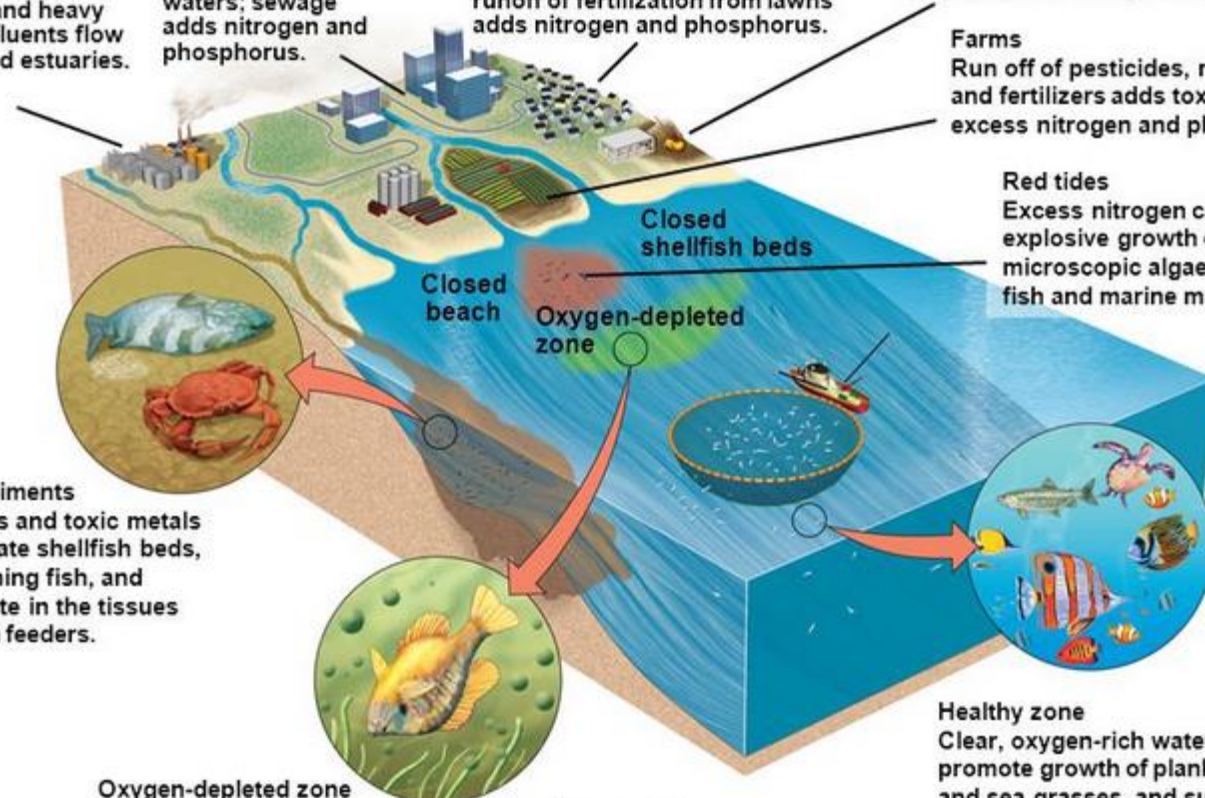
Chemicals and toxic metals contaminate shellfish beds, kill spawning fish, and accumulate in the tissues of bottom feeders.

## Oxygen-depleted zone

Sedimentation and algae overgrowth reduce sunlight, kill beneficial sea grasses, use up oxygen, and degrade habitat.

## Healthy zone

Clear, oxygen-rich waters promote growth of plankton and sea grasses, and support fish.



# OMEGA System



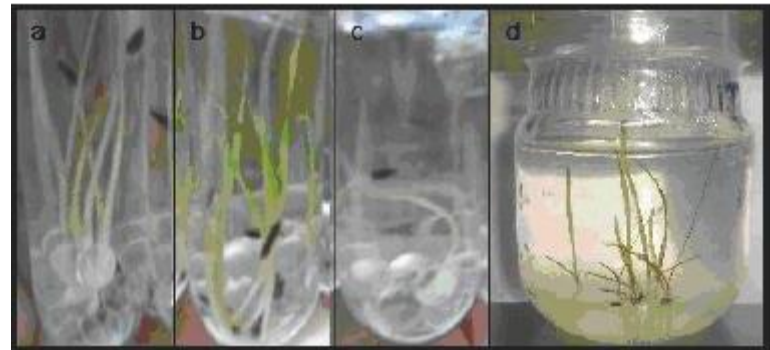


# Video ukázky z technologie seaweeds

- Ukázka pěstování mořských řas a jejich zpracování v Indii: <https://www.youtube.com/watch?v=qHo5db8kQO> 
- Technologie z Filipín: <https://www.youtube.com/watch?v=NZFNNVmC> 
- Těžba chaluh – problémy masivní těžby a ochrany přírody: <https://www.youtube.com/watch?v=hEIAIBFjdC> 

# Kultivační media

- Tekutá – nejčastěji používané typy medií: Z, BG<sub>11</sub> – sinice, BBM – zelené řasy, WC – rozsivky, OGM – krásivky
- Pevná – obvykle 1,5% agar
- Bifázová – kombinace tekutého media s pevným podkladem (agar, kouky



# Složení media Z

|                                                      |         |
|------------------------------------------------------|---------|
| MgSO <sub>4</sub> ·7H <sub>2</sub> O                 | 0.25 g  |
| NaNO <sub>3</sub>                                    | 0.467 g |
| Ca(NO <sub>3</sub> ) <sub>2</sub> ·4H <sub>2</sub> O | 59 mg   |
| NH <sub>4</sub> Cl                                   | 31 mg   |
| Na <sub>2</sub> CO <sub>3</sub>                      | 0.02 g  |
| FeEDTA solution                                      | 10 ml   |
| Gaffron<br>micronutrients                            | 1.0 ml  |
| Deionized water<br>to                                | 1.0 L   |

## FeEDTA solution:

Made in two solutions:

Solution A - 2.8 g FeCl<sub>3</sub> in 100 ml 0.1 N HCl

Solution B - 3.9 g EDTANa<sub>2</sub> in 100 ml 0.1 N NaOH

Add 10 ml solution A and 9.5 ml solution B plus water to 1 L.

## Gaffron micronutrients

|                                                                                                   |         |
|---------------------------------------------------------------------------------------------------|---------|
| H <sub>3</sub> BO <sub>3</sub>                                                                    | 3.1 g   |
| MnSO <sub>4</sub> ·4H <sub>2</sub> O                                                              | 2.23 g  |
| ZnSO <sub>4</sub> ·7H <sub>2</sub> O                                                              | 0.22 g  |
| (NH <sub>4</sub> ) <sub>6</sub> Mo <sub>7</sub> O <sub>24</sub> ·4H <sub>2</sub> O                | 0.088 g |
| Co(NO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O                                              | 0.146 g |
| VO <sub>2</sub> SO <sub>4</sub> ·6H <sub>2</sub> O                                                | 0.054 g |
| Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> K <sub>2</sub> SO <sub>4</sub> ·2H <sub>2</sub> O | 0.474 g |
| NiSO <sub>4</sub> (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> ·6H <sub>2</sub> O              | 0.198 g |
| Cd(NO <sub>3</sub> ) <sub>2</sub> ·4H <sub>2</sub> O                                              | 0.154 g |
| Cr(NO <sub>3</sub> ) <sub>3</sub> ·7H <sub>2</sub> O                                              | 0.037 g |
| Na <sub>2</sub> WO <sub>4</sub> ·2H <sub>2</sub> O                                                | 0.033 g |
| KBr                                                                                               | 0.119 g |
| KI                                                                                                | 0.083 g |



# Složení media BBM

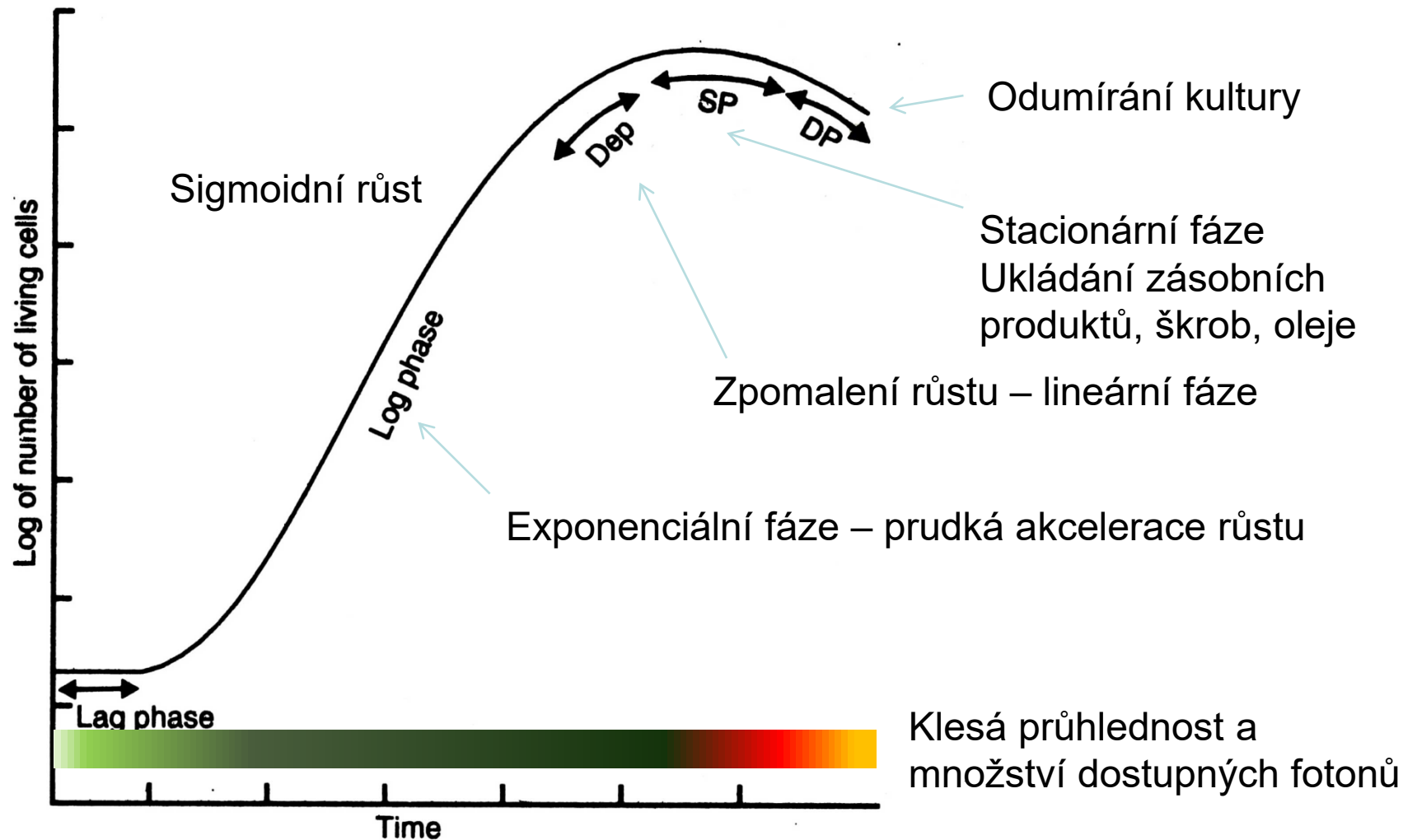
| Stock Solutions                                      | per Litre distilled water (dH <sub>2</sub> O) |                                                                                                                               |
|------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 1. NaNO <sub>3</sub>                                 | 25.0 g                                        |                                                                                                                               |
| 2. CaCl <sub>2</sub> .2H <sub>2</sub> O              | 2.5 g                                         |                                                                                                                               |
| 3. MgSO <sub>4</sub> .7H <sub>2</sub> O              | 7.5 g                                         |                                                                                                                               |
| 4. K <sub>2</sub> HPO <sub>4</sub>                   | 7.5 g                                         |                                                                                                                               |
| 5. KH <sub>2</sub> PO <sub>4</sub>                   | 17.5 g                                        |                                                                                                                               |
| 6. NaCl                                              | 2.5 g                                         |                                                                                                                               |
| 7. EDTA                                              | 50.0 g                                        |                                                                                                                               |
| KOH                                                  | 31.0g                                         |                                                                                                                               |
| 8. FeSO <sub>4</sub> .7H <sub>2</sub> O              | 4.98 g                                        |                                                                                                                               |
| H <sub>2</sub> SO <sub>4</sub>                       | 1.0 mL                                        |                                                                                                                               |
| 9. H <sub>3</sub> BO <sub>3</sub>                    | 11.42 g                                       |                                                                                                                               |
| 10. Micronutrients                                   | g.L <sup>-1</sup>                             | Add each constituent separately to ~800 mL of dH <sub>2</sub> O and fully dissolve between each addition. Then make up to 1L. |
| ZnSO <sub>4</sub> .7H <sub>2</sub> O                 | 8.82 g                                        |                                                                                                                               |
| MnCl <sub>2</sub> .4H <sub>2</sub> O                 | 1.44 g                                        |                                                                                                                               |
| MoO <sub>3</sub>                                     | 0.71 g                                        |                                                                                                                               |
| CuSO <sub>4</sub> .5H <sub>2</sub> O                 | 1.57 g                                        |                                                                                                                               |
| Co(NO <sub>3</sub> ) <sub>2</sub> .6H <sub>2</sub> O | 0.49 g                                        |                                                                                                                               |

# Stacionární kultivace



Kultivace v uzavřeném systému

# Ukázka kultivační křivky stacionární kultury

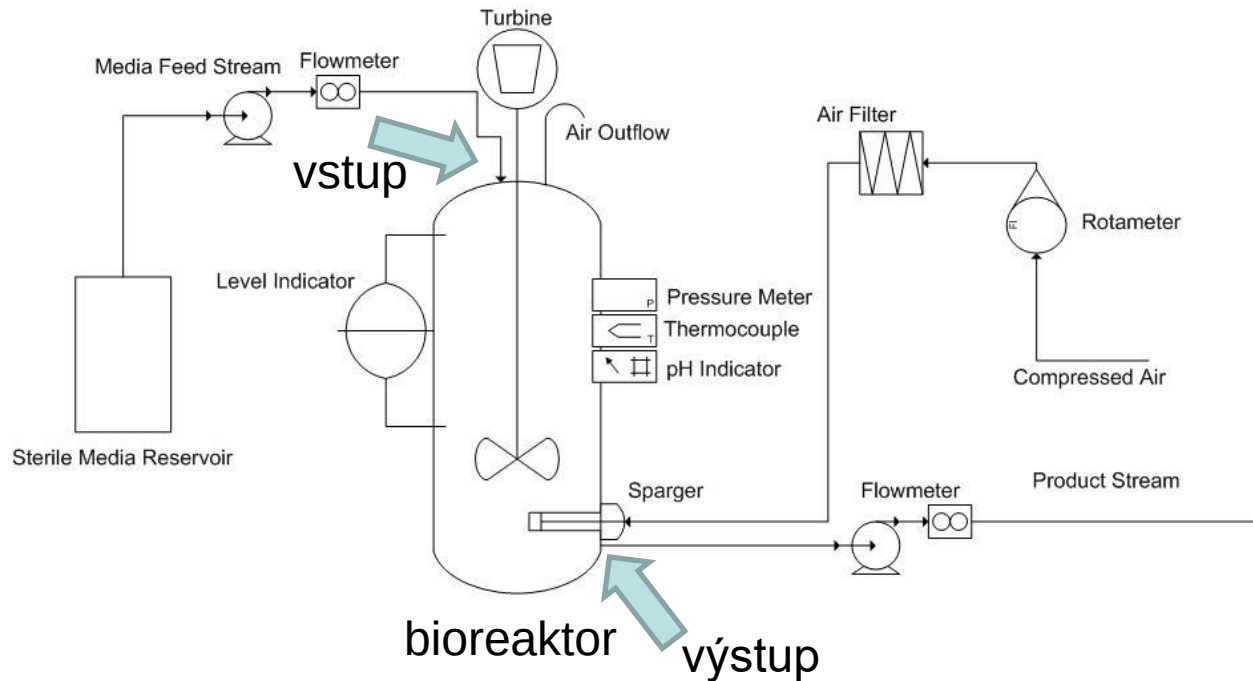




# Kontinuální kultivace

- Dlouhodobé kultivování
- Otevřený nebo částečně otevřený systém
- Průběžná kultivace s postupným doplňováním živin a odebíráním produktů
- Sofistikovaná kultivační zařízení oproti stacionárním kultivacím – specifická zařízení se vstupy a výstupy - bioreaktory

# Schéma kontinuální kultivace



Úroveň media na  
vstupu a výstupu je  
stejná

Vhodné pro testování  
vhodných  
kultivačních  
podmínek, zachování  
optimálních  
růstových rychlostí

Jednoduché  
nastavení reakčních  
podmínek

# Produktivita

- Stacionární vs. Kontinuální kultivace

Nízké vstupy,

Investice

Energie

Vybavení

Nižší

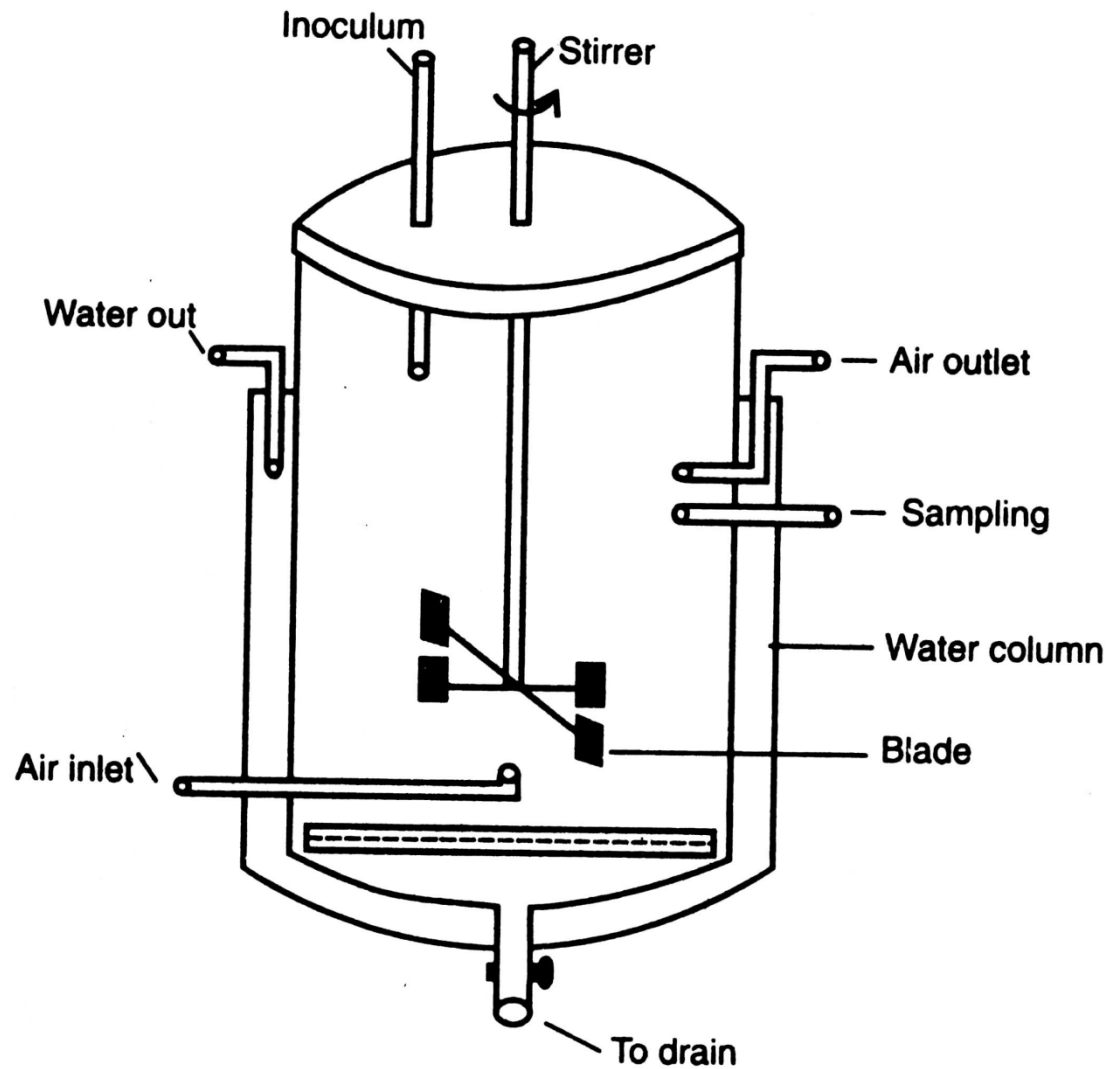
produktivita

Dražší zařízení

Vyšší know how

Vyšší produktivita (až několikanásobná)

# Model bioreaktoru

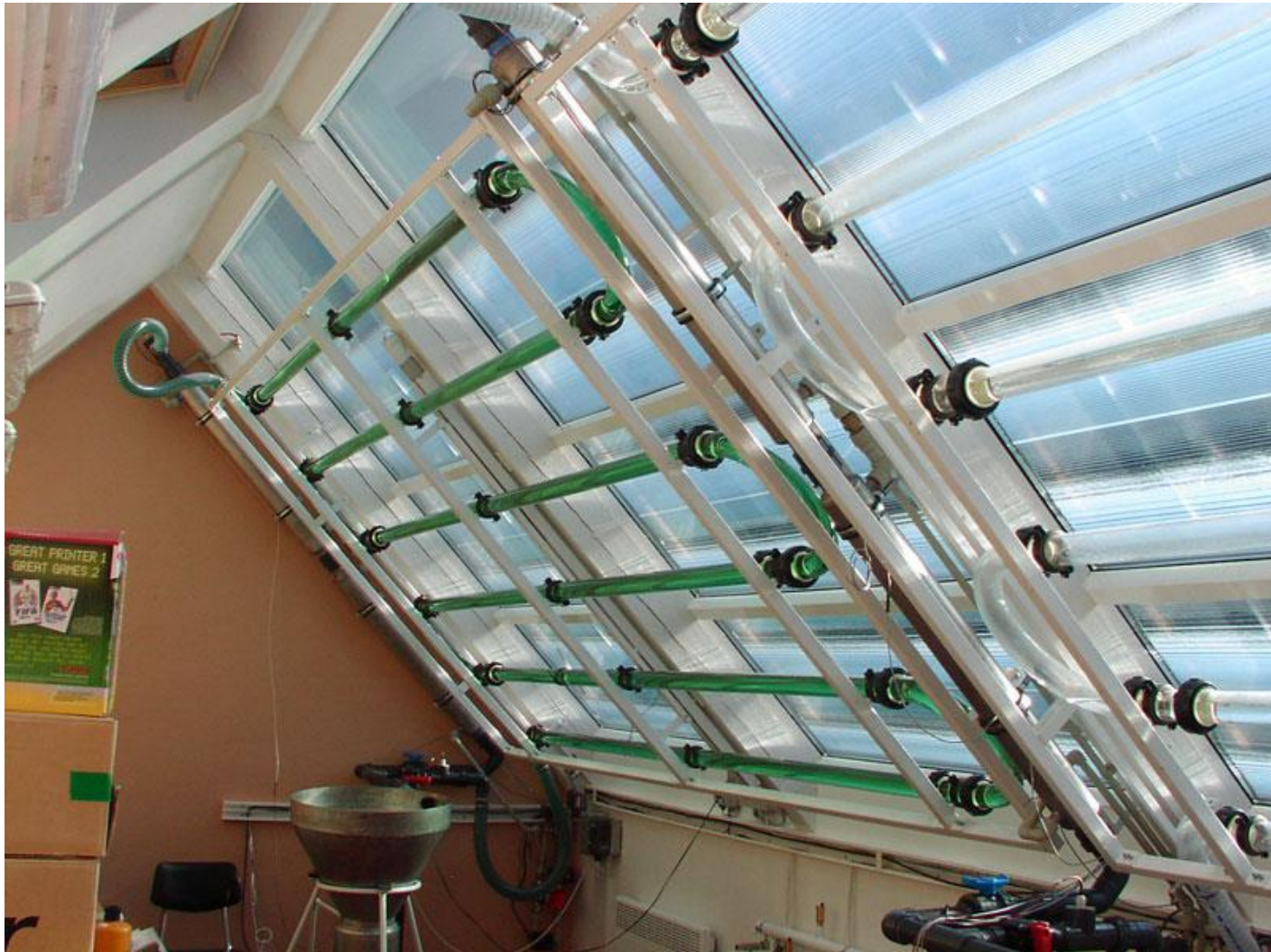




# Biorekator



# Koncentrační bioreaktor

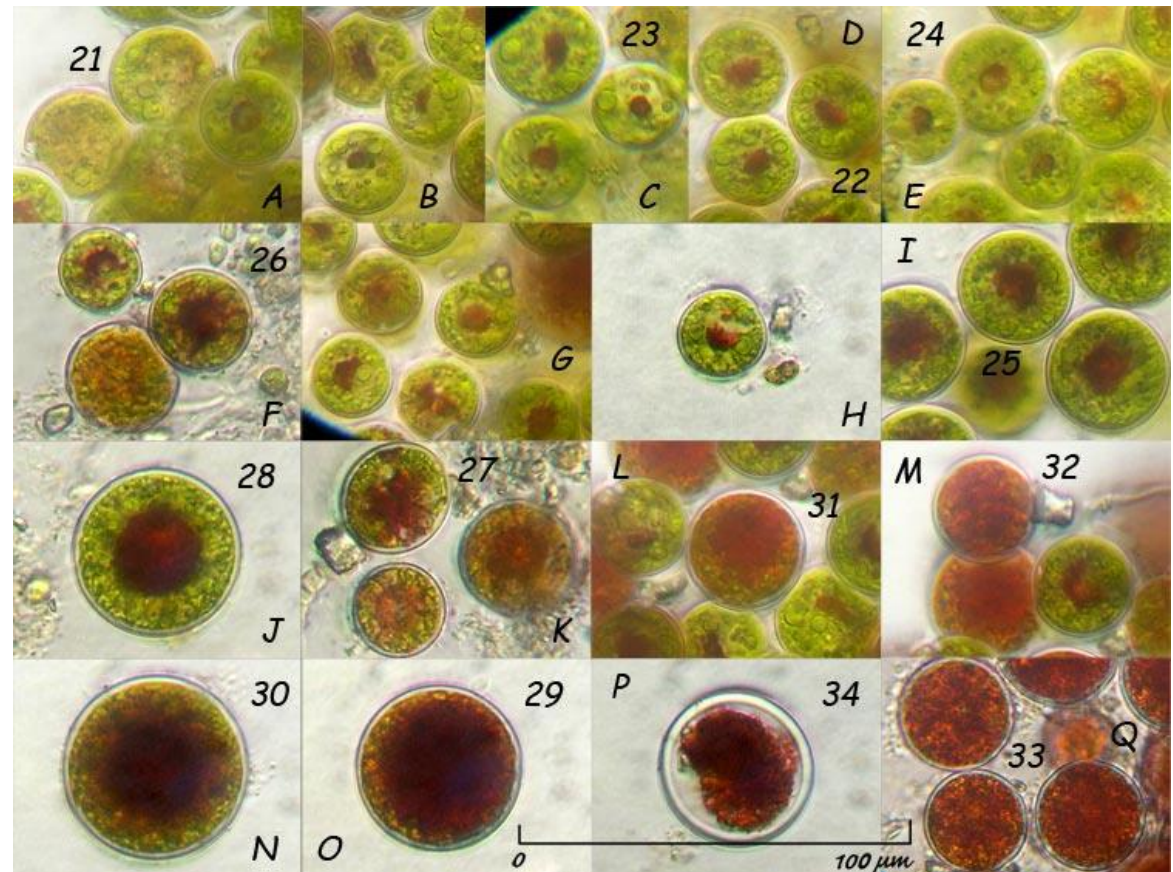
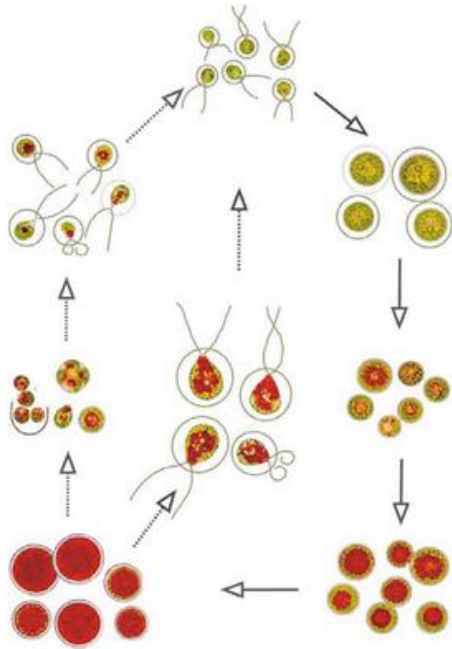




# Velkoobjemová kultivace



# *Haematococcus pluvialis* – životní cyklus





# *Haematococcus pluvialis*



# Od zelené řasy k červenému prášku



# Produkce astaxanthinu v Izraeli



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## NEWS & EVENTS

### **Natural and Artificial dietary supplements**

An interactive panel discussion about efficacy and safety of natural and artificial dietary supplements Friday, March 7, 2014 Anaheim Marriott Platinum 3 Hosted By NAXA &nb

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**Algatechnologies Extends Shelf Life of AstaPure® Natural**

## CONTACT US

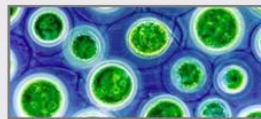
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## ALGATECHNOLOGIES

Algatechnologies is a rapidly growing biotechnology company, specializing in the commercial cultivation of microalgae. Founded in 1998, Algatechnologies is a world leader in the production and supply of **AstaPure®** - a premium natural astaxanthin - one of the world's most powerful antioxidants sourced from the microalga *Haematococcus pluvialis*.



### Microalgae Cultivation

Algatechnologies offers its knowhow in large-scale cultivation and post-processing of microalgae on

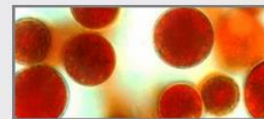
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### Applied research

Algatechnologies is one of the global leaders in the commercial cultivation of microalgae, with over

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### Natural astaxanthin

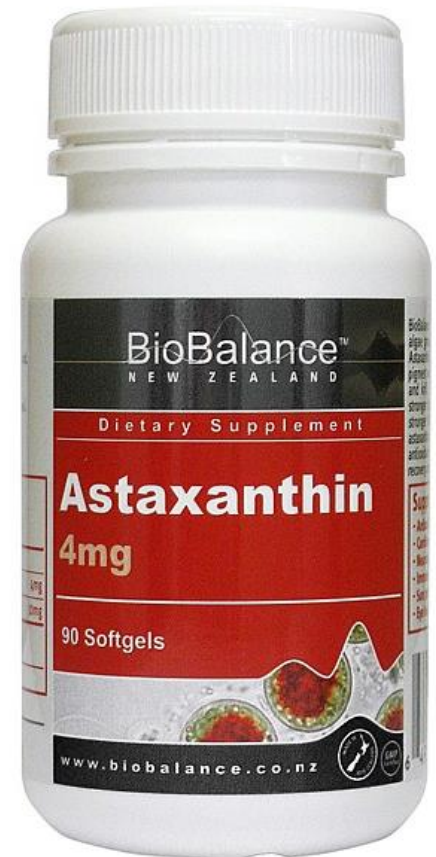
Astaxanthin is the dark red organic pigment found in algae and aquatic animals. The most widespread

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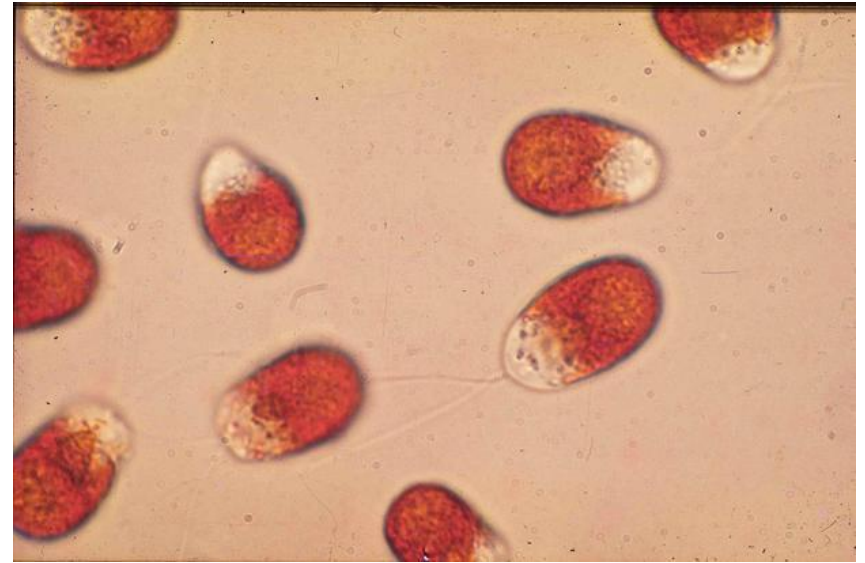


# Astaxanthin





# *Dunaliella salina*



# Johnsons Medium (J/I)

**To 980 ml of distilled water add:**

|                                      |                                      |
|--------------------------------------|--------------------------------------|
| NaCl                                 | as needed to obtain desired salinity |
| MgCl <sub>2</sub> ·6H <sub>2</sub> O | 1.5 g                                |
| MgSO <sub>4</sub> ·7H <sub>2</sub> O | 0.5 g                                |
| KCl                                  | 0.2 g                                |
| CaCl <sub>2</sub> ·2H <sub>2</sub> O | 0.2 g                                |
| KNO <sub>3</sub>                     | 1.0 g                                |
| NaHCO <sub>3</sub>                   | 0.043 g                              |
| KH <sub>2</sub> PO <sub>4</sub>      | 0.035 g                              |
| Fe-solution                          | 10 ml                                |
| Trace-element solution               | 10 ml                                |

**Fe solution (for 1 litre)**

|                                      |        |
|--------------------------------------|--------|
| Na <sub>2</sub> EDTA                 | 189 mg |
| FeCl <sub>3</sub> ·6H <sub>2</sub> O | 244 mg |

**Trace-element solution (for 1 litre)**

|                                                                                    |         |
|------------------------------------------------------------------------------------|---------|
| H <sub>3</sub> BO <sub>3</sub>                                                     | 61.0 mg |
| (NH <sub>4</sub> ) <sub>6</sub> Mo <sub>7</sub> O <sub>24</sub> ·4H <sub>2</sub> O | 38.0 mg |
| CuSO <sub>4</sub> ·5H <sub>2</sub> O                                               | 6.0 mg  |
| CoCl <sub>2</sub> ·6H <sub>2</sub> O                                               | 5.1 mg  |
| ZnCl <sub>2</sub>                                                                  | 4.1 mg  |
| MnCl <sub>2</sub> ·4H <sub>2</sub> O                                               | 4.1 mg  |

**Adjust pH to 7.5 with HCl**

# *Chlorella*

- Jedna z nejčastěji pěstovaných řas
- Široce hojný rod, drobné kulovité buňky, rozmnožování pomocí autospor
- Rychlý intenzivní růst, velká biomasa





# Produkce řasy *Chlorella*





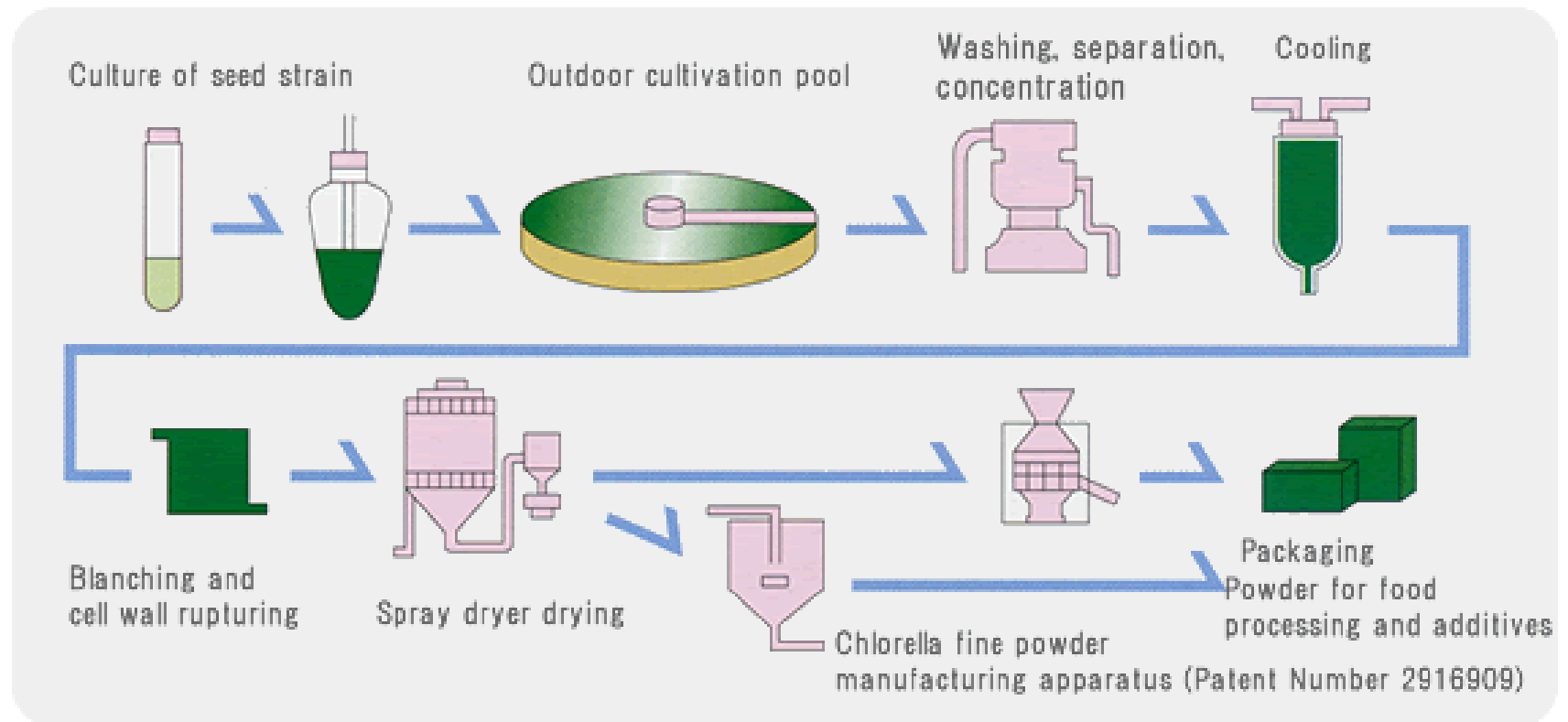
# Produkce řasy *Chlorella*



# Kultivace AV ČR v Třeboni



# Technologie *Chlorelly*





# *Chlorella* produkt

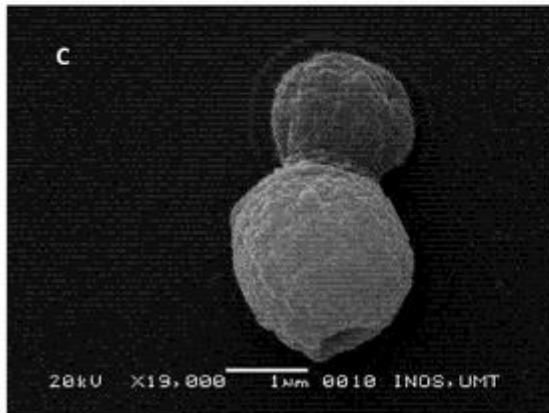
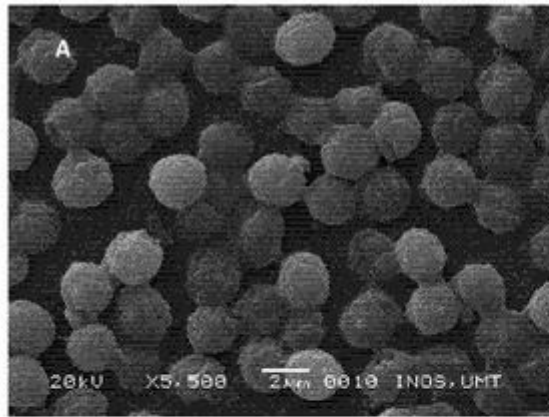




# Informace k produktům *Chlorella*

- Velmi zajímavé složení živin 60% bílkovin (celé spektrum AMK, nižší obsah methioninu, vyšší obsah lysinu), 20% sacharidů, 10% tuků!
- Vhodný poměr nenasycených mastných kyselin – regulace cholesterolu
- Vysoký obsah  $\beta$ -karotenu, chlorofylu-a, vit. B<sub>12</sub>, Ca<sup>2+</sup>, Mg<sup>2+</sup>, Fe<sup>3+</sup>, Zn<sup>2+</sup>, sloučeniny jodu
- Specifická struktura buněčné stěny – vazba těžkých kovů, pročištění trávicího traktu

# SEM snímek povrchu *Chlorelly*



# *Arthrospira / Spirulina*

- Vlákňité sinice, spirálovitý vzhled
- Významný rod v biotechnologii
- Zejména v tropických a subtropických oblastech
- Výroba potravinových doplňků

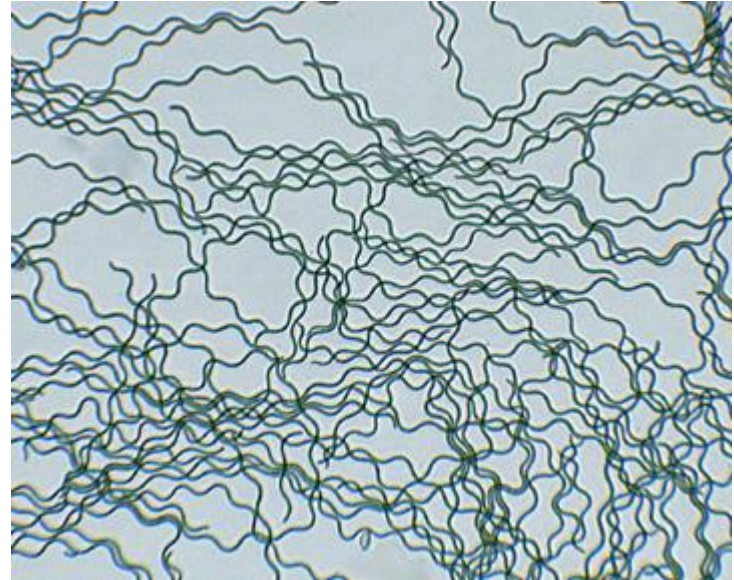
65-71% bílkovin

Pigmenty – chlorofyl,  $\beta$ -karoten, zeaxanthin, fykocyanin

Nenasycené mastné kyseliny

Vitamíny B, E, H

Ca, Mg, K, P, Mn, Se, Zn, Fe





# Biotechnologická firma





# Produkce v rozvojových zemích



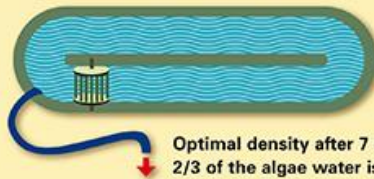
# Produkce v rozvojových zemích



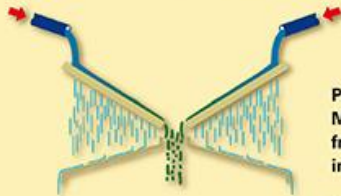


# Moderní technologie *Spiruliny*

## How Marcus Rohrer Spirulina™ is Harvested

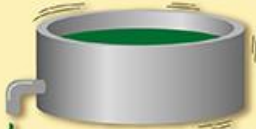


Optimal density after 7 days.  
2/3 of the algae water is pumped off.

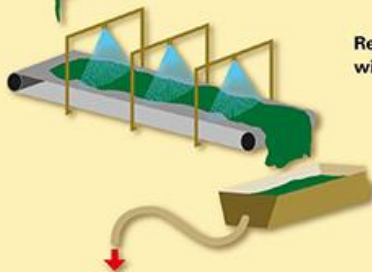


Pre-filtration using sheet sieves.  
Most of the water is separated from the algae and flows back into the basin.

The algae in the basin continue growing.



Filtration with fine-mesh oscillating sieves: the remaining water runs off, leaving a firm algae paste.



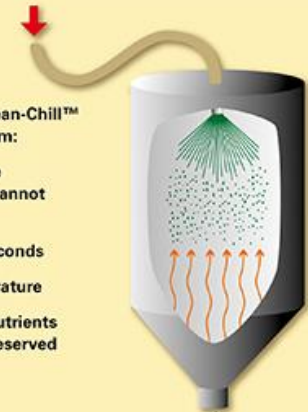
Repeated rinsing of the algae paste with fresh water.



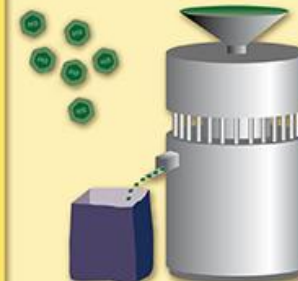
Daily quality controls during the growing period

## Patented Ocean-Chill™ Drying System:

- oxygen-free (nutrients cannot oxidise)
- in just 5 seconds
- low temperature
- essential nutrients are fully preserved



The pure Spirulina powder is immediately vacuum-packed.



## Exclusive to Marcus Rohrer Spirulina™

For maximum freshness, tablets and capsules are custom manufactured directly at the Hawaiian facility.

Storage in VioSol® foil sacks provides optimum protection during transport from Hawaii to Europe.

In Holland: Transferred into VioSol® energy-storage glass.

No loss of quality from source to jar!