

COMBINED HYDROMULCHING

Ref: HMC "DUAL BIO-R



CCTP BASE DUAL BIO ARMOR

Type :

For erosion with significant pedological and/or climatic constraints on slopes $> 60^\circ$ and $< 70^\circ$ or with a slope $> 5m$.

WARNING :

Each project has its own specific features, which sometimes require the input quantities to be refined. The data contained in this document are averages used on similar projects.

Euro-Tec technicians are at your disposal for further information and to prepare your seed mix - www.euro-tec.fr

Scope of application :

This specification describes the procedure for revegetation by HYDROMULCHING combined with the prior application of a "pedogenesis accelerator" in association with a biodegradable geotextile to reinforce mechanical resistance to tearing.

In contrast to HYDROSEEDING, HYDROMULCHING is a technique that prevents seeds and fertilisers from being washed away, but also prevents soil erosion before vegetation has even become established.

HYDROMULCHING, characterised by a quantity of fibrous material (mulch) $> 60 \text{ gr/m}^2$ - 600 kg/ha , also provides a favourable environment for the germination and rapid establishment of the herbaceous layer.

1- GEOTEXTILE INSTALLATION PRIOR TO SEEDING

1-1 Characteristics of BIODEGRADABLE GEOTEXTILE

The geotextile will be of the EURO-TEXTILE CP 400 type or equivalent in accordance with the characteristics described in the table below.

CHARACTERISTICS	
Type of fibre	100% coconut
Construction (No. of strings per dcm ²)	4.5 x 4.5
Permeability of coir structure (%)	64

PERFORMANCE	
Tensile strength, strain (ASTM D4595-86) <ul style="list-style-type: none"> • Production direction (kN/m) • Crosswise (kN/m) 	11.50 8.70
Elongation resistance (ASTM D4595-86) <ul style="list-style-type: none"> • Direction of production (%) • Crosswise (%) 	35.00 30.00

1-2 the geotextile

The geotextile is packaged in such a way as to make it easy to transport, store and handle - No heavy equipment is required for installation, as each roll can be handled by one or two people.

1- Earthworks

Level the substrate to create a flat surface free from vegetation, roots, stones etc. and fill in any holes or gullies. The substrate must be stable and properly compacted, particularly if the areas are backfilled.

2- Installation

Fix the geotextile using wooden stakes or metal staples at least 1 m beyond the crest of the slope / bank - Position the geotextile perpendicular to the foot of the slope - Stretch the geotextile in such a way that it does not wrinkle, while leaving it sufficiently mobile so that it can be used for other purposes.

The geotextile then "follows" the micro-relief of the substrate. The geotextile is then staked to maintain close contact with the substrate. This operation is essential to ensure the uniform development of the herbaceous layer.

3- Coverings

In hydraulic applications, overlaps of 0.15 m must be provided between the strips

laid perpendicularly in the direction of the current and from downstream to upstream to obtain a "tiling" effect. Stakes or staples should be placed every 0.5 m. In the case of dry slopes, overlap is necessary, but stapling is required. The strips will be "straddled" every 0.5 m.

4- Sowing

Hydromulching will be carried out facing the embankment to allow the fibrillar matrix to "penetrate" the geotextile mesh and reach the substrate.

2- HYDROMULCHING EQUIPMENT

Seeding will be carried out by HYDROMULCHING using specific equipment of the EuroMulcher type, complying with the EC directive defining health and safety requirements (Directive 2023/12/30 UE) and the compatibility of construction site equipment with electromagnetic waves (Directive 2014/30/UE)- ***An EU plate certifying compliance with these directives must be affixed to the equipment and a certificate of approval must be given to the SPS (health and safety protection coordinator).***

The equipment will preferably be fitted with a petrol engine, which is fully in line with a CSR approach that aims to protect people by limiting emissions that are sources of fine particles in particular and by limiting noise.

To ensure a "neat application that respects the works and ancillary facilities, the equipment will also be fitted with a semi-rigid hose reel, a shut-off valve and removable nozzles.

A description of the equipment and the certificate of approval must be attached to the tender.

3 - DESCRIPTION OF SUPPLIES

3-1 Description of "pedogenesis accelerator" supplies

■ VALOR-SOIL improvement complex or equivalent

VALOR-SOIL is a phyto-aseptic fibrous complex designed to eliminate seeds and potential pathogens. Applied hydraulically on the surface, it creates a "seedbed without the need for shallow tillage. It also improves soil structure and improves the C/N ratio.

Composition:

- * Bark fibre defibrated using the method 60 %
- * Wood fibre defibrated using the HORTIFIBRE method : 33 %
- * Mycorrhizal TRILLIS biochar : 4 %
specific surface area >420 m²/g according to the *Emett and Teller* method
minimum of 50 propagules per gram of *Glomus intraradices*
- * Freezing agent (*Cyamopsis tetragonoloba*) : 3 %

Carbon sequestration :

Biochar at a dosage of 150 kg/ha enables 364 kg/ha of CO₂ to be sequestered in the soil. Certification of biochar carbon credits by PURO EARTH

3-2 Description of "sowing supplies 3-2 -1

Seeds

The company will prove the origin of the herbaceous species in the mixtures by means of the certificates of origin issued by the Service Officiel du Contrôle des semences (SOC) and marked on the seed bags.

These certificates, which are less than 6 months old, indicate for the certified species :

- The supplier's name or code,
- The batch number
- Species and variety

After each job, the contractor must provide the client or project manager with all the information needed to check the quality and quantity of the seeds used (SOC labels).

3-2-2 Soil conditioners

All fertilisers and soil improvers must comply with EEC regulations.

- Germination activator: VEGE-MAX or equivalent
Concentrated liquid supply of humic and lignosulphonic acids.
100% soluble.

VEGE-MAX is a soil improver with a high C/N ratio that maintains, improves and protects the physical and chemical properties, structure and biological activity of the soil.

At the soil-root interface, VEGE-MAX strengthens the clay-humus complex, improving the soil's air/water balance, water retention capacity and cation exchange capacity (CEC).

Composition:

Dry matter	21 %
Organic carbon (corg)	10.1 %
Corg/N	20.2
Total potassium oxide (K ₂ O)	5 %
Electrical conductivity	150 mS/m
pH value	13

- Organo-mineral fertiliser (NFU 42-001) type VERT-EXPERT "NATURE" or equivalent
Obtained from plant and animal organic matter including algae, castor oilcake, vegetable oilcake and C3 sterilised animal powders.

Composition:

Dry matter content (weight of OM / raw product) (fruit cake and pulp, composted poultry manure, etc.)	90%
Organic matter on raw product (rate)	50%
Organic mineral fertiliser NPK 6-3-6 + 0.5 FER	NF U42-001
Total nitrogen (N) :	6 %
Of which organic :	5.5 %
Phosphorus :	3%
Potassium :	6%

3-2-3 Hedging products

- EURO-MAT "FGM" fibrillar erosion-resistant membrane or equivalent

A EURO-MAT fibrillar membrane is a fibrous complex applied by hydromulching, composed of fibrous materials stabilised with binders and colloids - germination and growth activators are also incorporated.

Formulation :

Raw materials : Betula payrefera / Populus tremuloides / Pinus
% wood fibre : 75 % +/- 2%
Interlocking" reinforcement fibre: organic 9% +/- 1%.
% Binder / activator : 15 % +/- 1 %
%Traceur : 1% Green or Natural
% Water retention capacity / dry weight (ASTM D7322) 1500

3-3 The water in the hydraulic mixture

The water used to make up the hydraulic mixture must have chemical characteristics compatible with the germinative activity of the seeds and the emergence of the seedlings.

The Company is responsible for obtaining the necessary authorisations to pump water.

Before the start of the worksite, the Company must provide the project owner, without the latter being held liable, with proof of the pumping authorisations obtained from the competent authorities.

4 IMPLEMENTATION DESCRIPTION

HYDROMULCHING "DUAL" is applied in 2 passes, leaving some drying time between the two.

- 1st pass with "pedogenesis accelerator" supplies
- 2nd pass with "Sowing" supplies

A third "reinforcement" pass will be made 6 to 12 months after the "SEMIS" pass, using supplies from art 1-3-2 "second pass".

4-1 - Dosages per hectare PASSAGE "Pedogenesis accelerator

Application is a one-step process:	First pass
VALOR-SOIL pedogenesis accelerator (Bt/ha)	260

4.2 - Dosages per hectare "sowing" by HYDROMULCHING

It is applied in two passes, with a "top-up" 6 to 12 months after the initial HYDROMULCHING.

	First pass	Second pass
Euro-seeding mixture ref (Kg/ha)	250	-
VERT-EXPERT "NATURE" organo-mineral fertiliser (kg/ha)	600	1 000
Fibrillar anti-erosion matrix EURO-MAT FGM (Bt/ha)	176	

5 - RECEIPT OF SUPPLIES

To to promote the control of supplies, these must be delivered in a single delivery.

6 - METRE OF SEEDED WORKS

The surface area of the sites to be grassed will be agreed before the work begins, so that supplies can be delivered all at once.

7 - GUARANTEE

The guarantee covers the following points:

- * Density & uniformity: 1 month after the first germinations, as long as the conditions have been favourable, a seedling count will be carried out - The expected result must be at least 40 u / dm² - The areas counted will be used as a standard to assess uniformity - Any peeling or poorly grown area (excluding mineral areas or areas > 40%) will be repeated - A peeling is considered to be an area where the density of seedlings is less than 20 u / dm².
- * Stability: No gullies will be tolerated - These gullies will have to be reseeded.
- * Quality of the plant cover: At the end of one growing season after sowing and fertilisation, the plant cover must show no signs of deficiency or disease that would endanger the survival of the established grass layer. If this is the case, fertilisation or treatment must be carried out as soon as possible, after approval by the project manager.