BARENBRUG

Regenerator™

Forage Mixes & Cover Crops

EDITION 1.0

Grow with Confidence

Introduction

Diverse annual mixes have many applications that include offering stock a varied diet, act as a cover-crop to protect otherwise fallow ground, grown as a green-manure crop to improve soil characteristics, and provide forage for beneficial insects. Many producers in dairy or beef and lamb finishing systems are encouraged by the potential benefits from including greater diversity of species.

Barenbrug's Regenerator blends are designed for a range of applications that consider seasonality, relative seed sizes, plant habit and compatibility, and to target specific outcomes.

Avoid the temptation, however, to rely on a perpetual series on annual crops. Use the Regenerator options as stepping-stone, in combination with addressing other potential production constraints such as grazing management, drainage, soil structure, salinity, pH and essential plant nutrients. For longer-term solutions we recommend using appropriately balanced perennial pastures, mixed perennial swards, or turf.

Horticulture and turf:

Curator Turf Guide

Temperate perennial pastures:

Renovator / Meatmaster Guide

Subtropical and tropical pastures:

Tropical Pasture Guide

Regenerator Guide
Edition 1.0
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Published July 2024

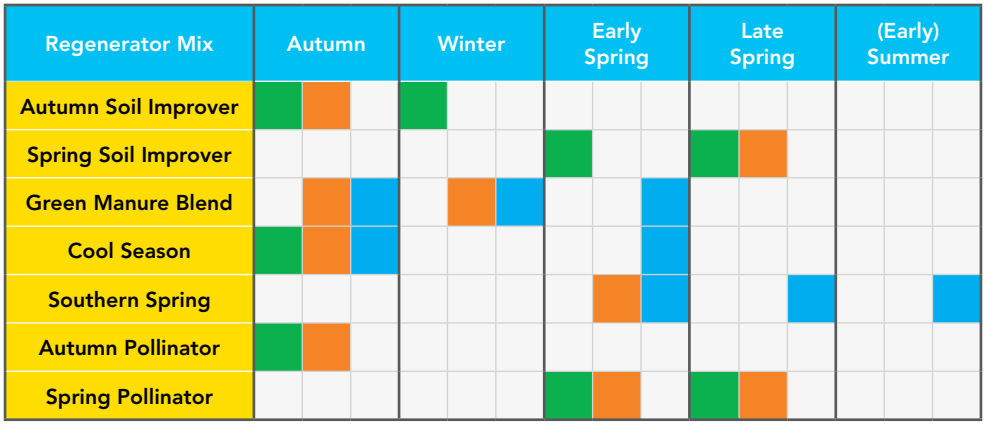
Contents

All seed mixes are described as seeds by percentage weight. Where a specific variety or mix component is not available, an appropriate, agronomically similar substitution will be made.

Regenerator Selection

Main Purpose		Climate Zone Suitability: Subtropical	Warm Temperate	Cool Temperate
Soil health	⇢	✓	✓	×
		✓	✓	×
		×	✓	✓
Diverse grazing	⇢	✓	✓	✓
		×	✓	✓
Encourage pollinators	⇢	✓	✓	×
		✓	✓	×

Typical Sowing Windows for Climatic Zones



Key: Subtropical Warm-temperate Cool-temperate

Suitability of crop timing and crop utility may vary depending on specific local site conditions and seasonal variation.

Guide to Utility and Outcomes							
Soil benefits	Grazing	Silage / Hay	Nitrogen fixation	Pollination		Regenerator Mix	Page
✓✓✓	✓✓✓	✓	✓✓	✓✓	----→	Autumn Soil Improver	6
✓✓✓	✓✓✓	✓	✓✓	✓✓	----→	Spring Soil Improver	7
✓✓✓✓	×	×	✓✓✓	✓	----→	Green Manure Blend	8
✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓	----→	Cool Season	10
✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓✓	----→	Southern Spring	11
✓✓✓	✓✓	✓✓	✓✓	✓✓✓	----→	Autumn Pollinator	12
✓✓✓	✓✓	✓✓	✓✓	✓✓✓	----→	Spring Pollinator	12

Regenerator Soil Improver Mixes

The Soil Improver mixes are formulated as diverse grazing and cover crops for the northern subtropical and warm-temperate zones. They each contain a balanced mix of seasonal legumes, cereal and partner species that offer diverse forage and features that can contribute to improving soil health.

These mixes are designed to help improve soil structure, boost soil nitrogen, and contribute to soil organic matter accumulation. Either option may be grazed with cattle or sheep.

Regenerator *Autumn Soil Improver*

350+ mm
Growing season rainfall

pH 5.2 – 7.5

Most soil types

Species	%
RM4 Vetch	40
Dunn Peas	20
Cereal Rye (ryecorn)	20
Fuze Annual ryegrass	10
Zulu II Arrowleaf clover	4
Captain Plantain	2
Commander Chicory	2
Tillage Radish	2
Sowing rate: 40-50 kg/ha	

Climate zones and sowing seasons:	
Subtropical	Mid-late autumn
Warm Temperate	Early-late autumn
Cool Temperate	Not suitable. Use ***Regenerator Cool Season***
Considerations	Max day-time temp of 30°C and falling For cool temperate climates use ***Regenerator Cool Season*** or ***Green Manure Mix***
Finish growth by	Mid-late spring in most areas

Soil benefits	Grazing	Silage / Hay	Nitrogen fixation	Pollination
✓✓✓	✓✓✓	✓	✓✓	✓✓

Regenerator
Spring Soil Improver

400+ mm
Growing season rainfall

5.2 – 7.5

Most soil types

Species	%
Lablab	25
Hemp	25
Forage sorghum	15
Sunflower	15
Millet	10
Radish	5
Phacelia	5
Sowing rate: 40-50 kg/ha	

Climate zones and sowing seasons:	
Subtropical	Early-late spring
Warm Temperate	Mid-late spring
Cool Temperate	Not suitable. ***Use Regenerator Southern Spring***
Considerations	Min 9am soil temp of 15°C and rising For cool temperate climates use ***Regenerator Southern Spring***
Finish growth by	Late-summer – early autumn in most areas

Soil benefits	Grazing	Silage / Hay	Nitrogen fixation	Pollination
✓✓✓	✓✓✓	✓	✓✓	✓✓

Green Manures

Green manures are sown into ground between crops by cropping farmers, fresh-market producers, and gardeners, usually during autumn and early winter, although they have application for spring and summer in some situations. Green manures are often used for vegetable cropping rotations, and may also be used for preparing ground for ornamental gardens, or more broadly to improve ground for following crops in agriculture generally. There is also wide-spread adoption in vineyard and other perennial horticultural enterprises for initial ground preparation or subsequent inter-row soil conditioning.

Regenerator *Green Manure Mix*

400+ mm
Growing season rainfall

pH 5.0 – 7.5

Most soil types

Species	%
Tic Beans	30
Field peas	20
Blue lupins	20
Cereal rye (Ryecorn)	10
Magnate forage barley	10
Express forage oats	10
Sowing rate: Full growing season (5-6 months) Fast turn-around (8-10 weeks)	 150 kg/ha 250 kg/ha

Climate zones and sowing seasons:	
Subtropical	Not suitable: *use Regenerator Autumn Soil Improver*
Warm Temperate	Mid-late autumn
Cool Temperate	Early-mid autumn, & late winter / early spring
Considerations	*Green Manure Mix* is not recommended for grazing
Finish growth by	Early-mid spring in most areas

Soil benefits	Grazing	Silage / Hay	Nitrogen fixation	Pollination
✓✓✓✓	✗	✗	✓✓✓	✓

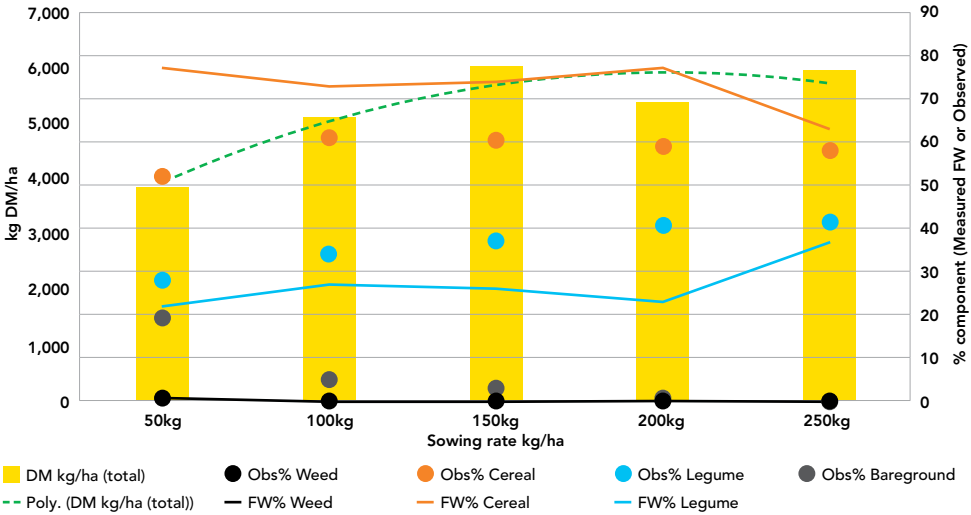
Green manure crop management

Species should be selected that will establish vigorously for the time of year planted, and be readily incorporated into the soil. Whilst one of the main roles of a green manure is to capture nutrients to make them available for subsequent cropping, there is often sound cause and justification to apply some form of fertiliser where elements may be lacking and thus impact the crops' growth potential. A soil test and reflection on recent cropping history will offer guidance.

Generating biomass quickly is a key for success. Crops for fast turn-around should be sown at seeding rates that assist with developing a quick ground cover, bearing in mind that we are not seeking to grow the crop to full maturity. Best results are achieved if the crop is relatively young, lush, and vegetative when it is time to finish it up. Typically allow for around 8-10 weeks' growth before knock-down herbicide, slashing, mulching, or digging in. The crops should be leafy and tender at and around 40–60 cm high with full groundcover at time of incorporation.

Allowing crops to grow for a fuller season and get taller may be required for retaining a longer period between annual crops, say over autumn, winter and into early spring. Such crops may be sown at lower seeding rates to allow for individual plants to properly develop. Be aware that this will increase the size of the crop and it may require more management at time of termination to smash-down or incorporate the bulk and more fibrous stems.

Sowing rate trial results



2023 Howlong Research Farm, Green Manure Mix rate of sowing trial, for a long season winter crop of 5 months. 150kg/ha offered the best combination of seasonal biomass accumulation, minimal bare ground, and outcompeted weeds. No seed treatment or herbicides were applied. For faster turn-around in 8-10 weeks, use higher sowing rates of up to 250kg/ha. FW% = measured fresh weight. Obs% = visual score frequency. DM = final crop mass as dry-matter yield.

Temperate Diverse Forages

Regenerator
Cool Season

450+ mm
Growing season rainfall

pH 5.2 – 7.5

Most soil types

Species	%
Arise Italian ryegrass	10
Express oats	10
Cereal rye (Ryecorn)	6.25
Magnate forage barley	10
Laser Persian clover	6.25
Volga Vetch	10
Tic (Faba) bean	20
Field pea	15
Commander chicory	3.75
Leafmore rape	2.5
Captain plantain	3.75
Phacelia	2.5

Sowing rate:

High rainfall/irrigation	50-60 kg/ha
Good dryland	40-50 kg/ha
Marginal dryland	30-40 kg/ha

Climate zones and sowing seasons:	
Subtropical	Mid-late autumn
Warm Temperate	Early-late autumn
Cool Temperate	Late summer – mid autumn / early spring
Considerations	Max day-time temp of 30°C and falling
Finish growth by	Mid-late spring in dry or hot areas, early-mid summer in cooler areas

Soil benefits	Grazing	Silage / Hay	Nitrogen fixation	Pollination
✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓

Regenerator
Southern Spring

400+ mm
Growing season rainfall

pH 5.2 – 7.5

Most soil types

Species	%
Arise Italian ryegrass	15
Express oats	15
Millet	15
Volga Vetch	20
Laser Persian clover	10
Tillage radish	4.5
Buckwheat	4
Commander chicory	4
Captain plantain	4
Leafmore rape	2.5
Phacelia	4
Sunflower	2

Sowing rate:

High rainfall/irrigation	50-60 kg/ha
Good dryland	40-50 kg/ha
Marginal dryland	30-40 kg/ha

Climate zones and sowing seasons:	
Subtropical	Not suitable
Warm Temperate	Not suitable
Cool Temperate	Mid spring – early summer
Considerations	Min day-time temp of 14°C and rising For subtropical and warm temperate climates use *Regenerator Spring Soil Improver* or *Spring Pollinator*
Finish growth by	Mid-late autumn. Although clover, chicory, plantain, and ryegrass have good prospects to continue into winter and beyond

Soil benefits	Grazing	Silage / Hay	Nitrogen fixation	Pollination
✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓✓

Regenerator Pollinator Blends

The Regenerator Pollinator mixes are designed for offering forage for bees and other beneficial insects in subtropical and warm-temperate zones. Pollination of neighbouring crops may be enhanced as the flowering crops offer well regarded bee forage species. As a haven for potential beneficial insects, the Regenerator Pollinator mixes can help improve overall on-farm species' diversity. The blends offer various flower types, shapes and colours, and a range of nectar and pollen producing options through the seasons.

Regenerator *Autumn Pollinator*


350+ mm
Growing season rainfall

5.2 – 7.5


Most soil types

Species	%
Capello Vetch	35
Cereal Rye (Ryecorn)	30
Fuze Annual Ryegrass	15
Mustard	5
Commander Chicory	5
Tillage radish	5
Zulu II Arrowleaf clover	2.5
Crimson clover	2.5
Sowing rate: 40-50 kg/ha	

Climate zones and sowing seasons:	
Subtropical	Mid-late autumn
Warm Temperate	Early-late autumn
Cool Temperate	Not suitable
Considerations	Max day-time temp of 30°C and falling For cool temperate climates use *Regenerator Cool Season*
Finish growth by	Mid-late spring in most areas

Soil benefits	Grazing	Silage / Hay	Nitrogen fixation	Pollination
✓✓✓	✓✓	✓✓	✓✓	✓✓✓

Regenerator *Spring Pollinator*


350+ mm
Growing season rainfall

5.2 – 7.5


Most soil types

Species	%
Buckwheat	25
Sunn hemp	25
Lablab	15
Forage sorghum	12.5
Sunflower	12.5
Phacelia	5
Mustard	2.5
Tillage radish	2.5
Sowing rate: 40-50 kg/ha	

Climate zones and sowing seasons:	
Subtropical	Mid-late spring
Warm Temperate	Early-late spring
Cool Temperate	Not suitable
Considerations	Min 9am soil temp of 15°C and rising For cool temperate climates use *Regenerator Southern Spring*
Finish growth by	Mid-Autumn in most areas

Soil benefits	Grazing	Silage / Hay	Nitrogen fixation	Pollination
✓✓✓	✓✓	✓✓	✓✓	✓✓✓

Care for Pollinators

Bees require nectar for energy and honey production, and pollen for proteins. A supply of both nectar and pollen is required, and it is often deemed beneficial to have a diverse range of source plants. Bees and other insects also require water, especially in dry times or dry settings.

Most flowering plants offer some benefit at flowering time, although timing, pollen and nectar supply varies with species. Plants can also help to offer the bees and other insects a water source: from offering dew, capturing precipitation in small plant parts like leaf axils etc, plant exudates and guttation. Often grasses may be the best source of such moisture and perhaps the pollen collected from flowering grasses is somewhat an accidental benefit.

Mixes for insect foraging and habitat should be sown as untreated (bare) seed or at the very least should not have seed treatment insecticide applied. Whether the seed treatment grazing WHP is observed or not it is better to avoid the potential for residual issues and help mitigate concerns and perceptions especially around the neonicotinoid type seed treatments. Sowing untreated, bare seed eliminates this concern.

Soil Carbon and Limitations

Improved soil carbon levels in the form of soil organic matter (SOM), offers many benefits, that include:

- Improved soil stability – reduced erosion risk
- Improved soil water holding capacity – increased yield, length of season and dry tolerance
- Improved nutrient holding capacity – opportunity to improved overall soil fertility
- Helps mitigate nutrient loss that may occur through leaching or surface erosion
- Acts as a buffer to rate of change of pH and salinity
- Better tilth, germination, and opportunity for plant development.

Prospects to improve or stabilise the levels of SOM, will depend on physical and chemical factors that influence soil carbon accumulation are (chiefly):

Oxygen availability

Oxygen (in air) reacts with the SOM to release CO_2. Coarse textured soils (sands, light loams etc) generally contain more air than clay or silt soils, and SOM tends to fluctuate more in such sandier, lighter soils. The dense, tighter nature of soils with finer particles offer relatively reduced opportunity for gas exchange. Cultivation admits air to the soil and exposes SOM to oxidation. At the extreme end of the scale, waterlogging, whilst not generally appropriate for successful plant growth, excludes air, and increases the opportunity for SOM to accumulate e.g. peat soils and bogs.

Temperature

Chemical reactions and exchange of gases occur at faster rates with increasing temperature. Hence, we generally see lower SOM levels in higher temperature environments, compared to cooler areas. In cooler conditions, the soils have increased capacity to retain accumulated SOM.

Humidity

Water is essential for achieving good rates of plant growth as well as to support the soil eco-system. Dry soils and environments will have reduced capacity for plant bio-mass accumulation and reduced biological activity within the soil.

Soil structure and chemistry

The nature of many soil types, particularly sub-soils, will have a marked influence on the capacity to allow plants to develop root systems, grow successfully and contribute bio-mass into the soil carbon pool. Soils with clay minerals that develop massive or blocky textures can be limiting,. Acid sands with pH levels below 3.9 or so, also present similar challenges. Deep ripping to create root channels and/or incorporation of lime, gypsum or other minerals may be helpful, although such practices are often cost prohibitive or limited in their effectiveness.

Soils and environments have a soil carbon saturation point, beyond which little or no practical gain may be made to improve SOM levels. As a continuum, cooler, wetter, heavier textures soils are favoured to achieve higher SOM levels than dry, warm, lighter textured soils. There will likely be seasonal fluctuations in SOM, and influences from other events such as prolonged drought, fire, or floods.

The are also activities and interventions that we may make to influence SOM and soil health:

Activities that tend to reduce SOM:

- Cultivation
- Bare soil
- Annual cropping
- Continuous or over-grazing
- Declining fertility
- Increasing salinity or sodicity
- Increasing acidification.

Activities that have prospects to improve SOM:

- Improve soil structure – lime, gypsum, deep ripping etc (if required)
- Improved soil fertility and balance: pH, N, P, K, S, TEs etc
- Use of green manure or brown manure crops
- Minimum-till or no-till cropping systems
- Perennial horticulture with living ground cover
- Perennial pasture systems, well managed.

In a situation with degraded soil fertility, soil structure or diminished SOM, intervention with growing a series of well managed annual crops such as the Regenerator range will likely be beneficial. For a more permanent solution, addressing soil constraints, fertility and adopting a system with perennial species, will offer the best prospects for long-term SOM maximum values to be achieved and stabilised.

Grazing Management of Diverse Annual Forages

Annual diverse forage mixes will generally offer feed in around 7-10 weeks after sowing. As grazing ensues, more palatable or tender plants may be preferentially grazed and removed by the stock. Plants that have good capacity for re-growth through ground-level growing point or multiple buds on the stem have the best prospects for re-growth. Grasses and clovers have excellent re-growth capacity. Cereals are very good as well as some brassicas, chicory, and plantain. Many other species have limited or little re-growth prospects after grazing, and a number may require some careful management to enable useful re-growth.

Crops may be left for later grazing to grow tall and offer more feed at the first grazing, although this will often reduce the re-growth potential, for some species may become over-mature or others outcompeted. As the season progresses and annual forages move towards maturity, potential for re-growth in all species declines.

Regrowth potential after grazing is maximised by careful grazing management. This may either be through allowing the stock a small portion of the paddock for a few hours a day, or adopting break-fencing, and using a back-fence to protect the previously grazed portion, allowing it 3-6 weeks to re-grow. To allow even the most grazing tolerant species to recovery well after grazing, avoid grazing duration of greater than 2-3 days. After a day or two, plants will be developing new leaves, and if these are removed or damaged, re-growth for the next grazing round will be limited and overall production will be reduced.

A small number of highly useful green-manure crop species are not recommended for grazing as they may contain elevated levels of plant toxins, that if grazed in high volume, may presents animal health problems. Grazing of flowering brassicas species should also be avoided.

Reliable recovery from grazing:

- Ryegrasses
- Clovers
- Oats
- Barley
- Wheat
- Triticale
- Cereal rye (ryecorn)
- Forage rape
- Leafy turnip
- Plantain
- Chicory
- Millet
- Pennisetum
- Forage sorghum
- Teff
- Lablab

Limited recovery from grazing:

- Radish
- Kale
- Vetch
- Sun-hemp
- Phacelia
- Buckwheat

Unlikely to recover well from grazing:

- Turnips
- Faba bean
- Peas
- Lupins

Not recommended for grazing:

- Bitter (blue) lupins
- Mustards (flowering)

Custom Mixes

The Regenerator mixes offers options to suit most situations for diverse seasonal crops. In instances where unique objectives are required, Barenbrug can offer custom mixing for seed orders over 250kg. The table below shows the seasonality of the most viable options for most situations. There is a big difference in seed sizes, plant habit and seedling vigour of these species. Contact your Barenbrug Territory Manager to assist with obtaining a well-balanced custom blend to suit your outcomes.

			Regional sowing seasons		
Seasonality	**Type**	**Species**	**Subtropical**	**Warm Temperate**	**Cool Temperate**
Cool season species	Grass	Barley	Autumn	Autumn	Autumn or early spring
	Grass	Cereal rye (ryecorn)	Autumn	Autumn	Autumn or early spring
	Grass	Oats	Autumn	Autumn	Autumn or early spring
	Grass	Ryegrasses	Autumn	Autumn	Autumn or early spring
	Grass	Triticale	Autumn	Autumn	Autumn or early spring
	Grass	Wheat	Autumn	Autumn	Autumn or early spring
	Legume	Clovers	Autumn	Autumn	Autumn or early spring
	Legume	Faba bean	Autumn	Autumn	Autumn or early spring
	Legume	Lupins	Autumn	Autumn	Autumn or early spring
	Legume	Peas	Autumn	Autumn	Autumn or early spring
	Legume	Vetch	Autumn	Autumn	Autumn or early spring
Temperate warm season or Cool season in hot summer environments	Brassica	Forage rape	Autumn	Autumn	Early autumn or spring
	Brassica	Leafy turnip	Autumn	Autumn	Early autumn or spring
	Brassica	Mustards	Autumn or early spring	Autumn or early spring	Early autumn or spring
	Brassica	Radish	Autumn or early spring	Autumn or early spring	Early autumn or spring
	Brassica	Turnips	Autumn	Autumn	Early autumn or spring
	Herb	Chicory	Autumn	Autumn	Early autumn or spring
	Herb	Phacelia	Autumn or early spring	Autumn or early spring	Early autumn or spring
	Herb	Plantain	Autumn	Autumn	Early autumn or spring
Warm season species	Herb	Buckwheat	Spring	Spring	Late spring
	Herb	Sunflower	Spring	Spring	Late spring
	Legume	Lab-lab	Spring	Spring	Not suitable
	Legume	Sun-hemp	Spring	Spring	Not suitable
	Grass	Forage sorghum	Spring	Spring	Late spring
	Grass	Millet	Spring	Spring	Late spring
	Grass	Pennisetum	Spring	Spring	Late spring
	Grass	Teff	Spring	Spring	Late spring

Tip:

Avoid the temptation to include perennial species in the same mix with annuals. Similarly, avoid over-sowing vigorous annual species into a viable, existing perennial pasture, unless intending to terminate it next season.

When the annual species finish and die out, there will be gaps remaining that will likely be colonised by weeds, and the remnant perennials will likely not present a viable pasture.

If an annual crop is desired:
- sow only annuals.

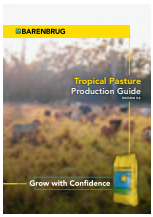
If a perennial pasture or ground cover is desired:
- fix any site and soil constraints and,
- sow only perennials.

Notes:

Other publications from Barenbrug:

Winter Feed & Forage Production Guide
Edition 2.0

Summer Forage Production Guide
Edition 4.0



Tropical Pasture Production Guide
Edition 3.0

Barenbrug Seed Guide
Edition 7.1

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