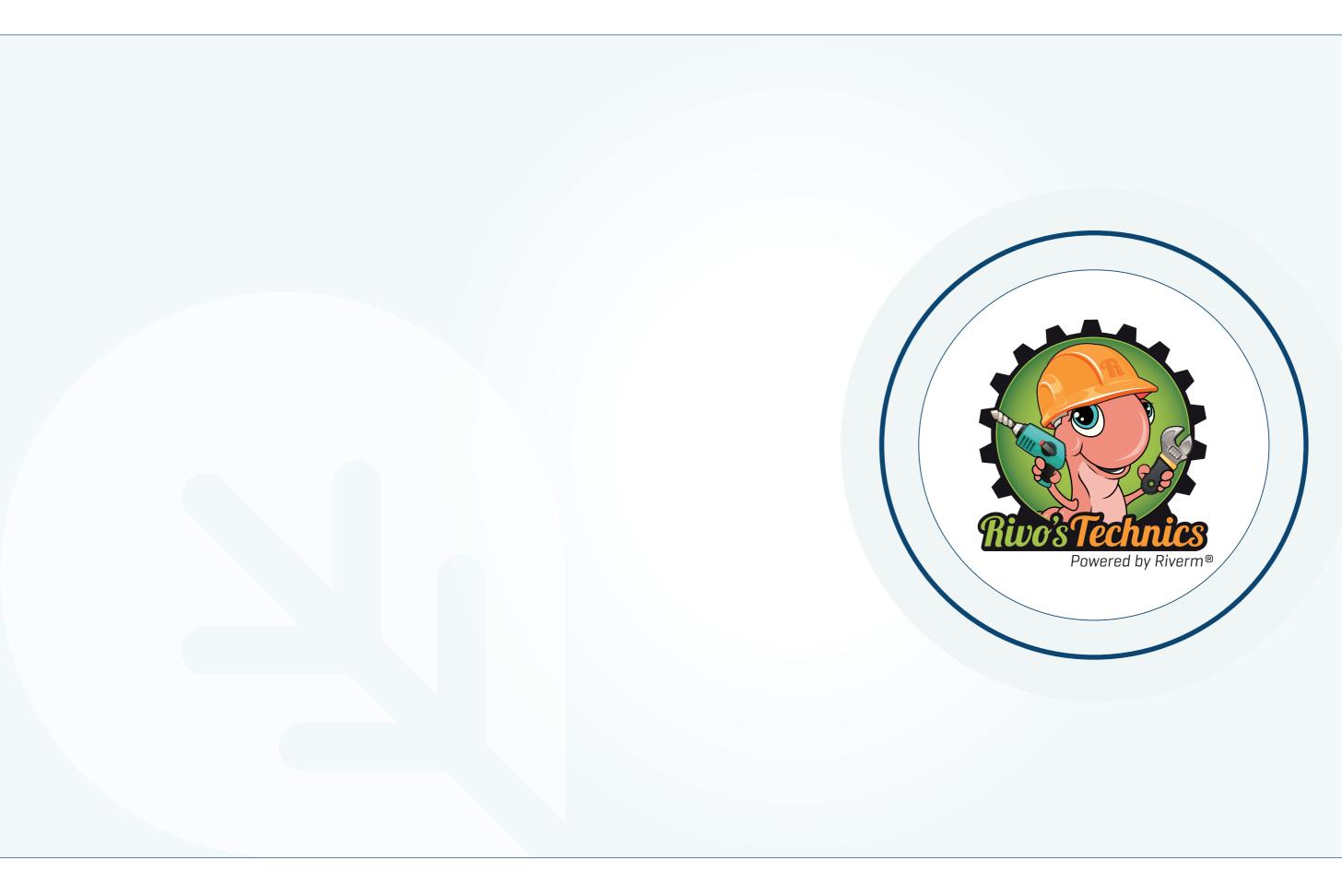


# COMPOST AND VERMICOMPOST Production Facility Project Presentation



#### COMPOST AND VERMICOMPOST Production Facility Project Presentation



# COMPOST AND VERMICOMPOST Production Facility Project Presentation



# > contents



#### COMPOST AND VERMICOMPOST Production Facility Project Presentation

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## CERTIFICATES



	LISANS BELGESI
Firmanın	
Ticari Ünvanı	RİVERM KOMPOST VERMİKOMPOST TARIM HAYVANCILIK MAKİNA SAN.VE TİC.LTD.ŞTİ.
Lisans Türü	Oretici ·
Lisans No	1230
Merkez Adresi	NUSRATLI MAHALLESİ 5011 SOKAK NO:5 SÜLEYMANPAŞA / TEKİRDAĞ
Telefon Numarası	02822292070
Fax Numarası	02822292070
Vergi Dairesi	SÜLEYMANPAŞA
Vergi Numarası	7350750747
Üretici ise, üretim tesislerinin adresi	1 - NUSRATLI MAHALLESİ 5011 SOKAK NO:12 SÜLEYMANPAŞA / TEKİRDAĞ
Fason Üretimlerde FasonÜreticinin Adı ve Üretim Tesisi Adresi	0.00
Veriliş Nedeni	ADRES DEĞİŞİKLİĞİ NEDENİYLE YENİLEME
Bu belge 29/06/2015 tarihinden itib	aren 5 yıl geçerlidir.

Ali Metin KAYCIOGLU Genel Müdür a. Daire Başkanı

	anlık Makamı Oluruna istinaden yirket si tarih ve 1893 sayılı Başkanlık Makamı esi yapılmıştır. Volkarı Berhay, AAş R Helefiye Başkanın, Bethiye Başkanı adı
407/2005 tarihli ve 2005/9207 sayılı Bakanlar Kuru	la Kararı ile yürürlüğe konulan İşyeri Açma ve Çalışma
Rahsatlarına İlişkin Yönetmelik kapsamında düzenler	nmiştir.
*Akaryakıt, sıvılaştırılmış petrol gazı, sıvılaş	stinimiş doğal gaz ve sıkıştınımış doğal gaz istasyonu
niteliğindeki işyerleri için doldurulacaktır.	
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TARIM VE ORI	MAN BAKANLIĞI Genel Müdürlüğü
	ER TESCIL BELGESI
	ER TESUL BELGEDI
imanin	RIVERM KOMPOST VERMIKOMPOST
Ticari Ünvanı	RIVERM KOMPOST VERMIKOMPOST TARIM HAYVANCILIK MAKINA SAN.VE TIC.LTD.ŞTI.
.isans Türü(Üretici veya Üretici(İthalatçı))	Oretici
isans No	1230
Jrūnūn	
fürü	ORGANİK ÜRÜNLER
Tip İsmi	Sıvı Solucan Gübresi
Dinsi	Sivi
/erilen Tescil No	11595
Marka veya Ticari Adı(varsa)	RÍVO SIVI SOLUCAN GÜBRESI
Ambalaj Üzerindeki İşaretlemeler	
Firmanın Ticari Ürivanı veya Kısa Adı	RİVERM KOMPOST VERMİKOMPOST TARIM HAYVANCILIK MAKİNA SAN.VE TİC.LTD.STİ.
Tip İsmi	Sivi Solucan Gübresi
Dretildiği Ülke (Türkiye Veya İthalat)	Türkiye
Beyan edilen özellikler	
Organik Madde %	8
Toplam Azot %	0.6
Organik Azot %	0.3
Suda Çözünür K20 %	0.8
Toplam (Humik + Fulvik) Asit %	3
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Diğer İşaretler	Cocuklardan Uzak Tutunuz, Diğer Güvenlik Tedbirleri

國

SÜLEYMANPASA

RUHSAT VE DENETİM MÜDÜRLÜĞÜ

İŞYERİ AÇMA VE ÇALIŞMA RUHSATI

luğu Yer : <u>Ada No: - Pafta : 3 Parsel No: 275</u>

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lşyerinde Yanıcı ve Parlayıcı Madde Kategorisindeki Sıvıların Depolanması Amacıyla Bulunacak Depoların Hacmi\* : 1.Depo 2.Depo 3.Depo 4.Depo 5.Depo 6.Depo

İşyerinin Adresi : NUSRATLI MAHALLESİ, 5011 SOKAK, NO: 12 SÜLEYMANPAŞA/ T.DAĞ

lşyerinde Yanıcı ve Parlayıcı Madde Kategorisindeni or-Sınıfı/Sınıfları\* Ruhsatın tarih ve sayısı :03./06/2014/58

RİVERM KOMPOST VERMİKOMPOST TARIM HAYVANCILIK MAKİNA SAN. VE TİC. LTD.ŞTİ.

 RİVERM KOMPOST VERMİKOMPOST TARIM HAYVANCILIK MAKİNA SAN, VE TİC, LTD.STİ.

ORGANİK GÜBRE (SOLUCAN KÜLTÜRÜ, SOLUCAN GÜBRESİ, KOMPOST, TARF VE SIVI GÜBRE) ÜRETEN İSVERİ

Adı Soyad

Faalive



Kaynaklı Gübrelere Dair

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ADRESI			ağı No:39 Balçova - İZN	líR
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ADI		COMPOST VERMIN	COMPOST TARIM HAY	VANCILIK MAKINA
ADRESI		ahallesi 5011. Sok.	No:12 Süleymanpaşa	TEKIRDAĞ
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AÇIKLAMALAR	Oretim yuka	andaki adreste yapılı	naktadır.	
M	ineşebbis her	hangi bir konvansiyo	nel tarım girdisi üretmeme	ktedir.
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TARIM VE OR Bitkisel Oretim	F.C. MAN BAKANLIĞI Genel Müdürlüğü
ORGANİK ÜRÜNL	ER TESCIL BELGESI
Firmanin	
Ticari Ürivanı	RİVERM KOMPOST VERMİKOMPOST TARIM HAYVANCILIK MAKİNA SAN.VE TİC.LTD.ŞTİ.
Lisans Türü(Üretici veya Üretici(İthalatçı))	Üretici
Lisans No	1230
Ürünün	
Tūrū	ORGANÍK ÜRÜNLER
Tip İsmi	Sıvı Solucan Gübresi
Cinsi	Sm
Verilen Tescil No	11595
Marka veya Ticari Adı(varsa)	RÍVO SIVI SOLUCAN GÜBRESÍ
Ambalaj Üzerindeki İşaretlemeler	
Firmanın Ticari Ürivanı veya Kısa Adı	RİVERM KOMPOST VERMİKOMPOST TARIM HAYVANCILIK MAKİNA SAN.VE TİC.LTD.STİ.
Tip İsmi	Sivi Solucan Gübresi
Üretildiği Ülke (Türkiye Veya İthalat)	Türkiye
Beyan edilen özellikler	
Organik Madde %	8
Toplam Azot %	0,6
Organik Azot %	0,3
Suda Çözünür K2O %	0,8
Toplam (Humik + Fulvik) Asit %	3
Maksimum EC (dS/m)	2,5
pH	3-5
Ürünün garanti edilen net ağırlıkları veya hacimleri	1-3-5-7-10-20-25-30-50 Lt
Diğer İşaretler	Çocuklardan Uzak Tutunuz, Diğer Güvenlik Tedbirleri
Veriliş Nedeni	lik Defa
Bu belge 11/09/2018 tarihinden itibaren 5 y Bu belge, Tarımda Kullanılan Organik, Min	





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TARIM VE OR	.C. MAN BAKANLIĞI Genel Müdürlüğü
ORGANIK TOPRAK DÜZENLE	YİCİ ÜRÜNLER TESCİL BELGESİ
Firmanin	
Ticari Orivani	RIVERM KOMPOST VERMIKOMPOST TARIM HAYVANCILIK MAKINA SAN.VE TIC.LTD.\$TI.
Lisans Türü(Üretici veya Üretici(İthalatçı))	Ûretici
Lisans No	1230
Drünün	
Türü	ORGANIK TOPRAK DÜZENLEYİCİ ÜRÜNLER
Tip İsmi	Leonardit
Cinsi	Kati
Verilen Tescil No	11736
Marka veya Ticari Adı(varsa)	Rivo's Leonardit
Ambalaj Üzerindeki İşaretlemeler	
Firmanın Ticari Ürivanı veya Kısa Adı	RİVERM KOMPOST VERMİKOMPOST TARIM HAYVANCILIK MAKİNA SAN.VE TİC.LTD.ŞTİ.
Tip İsmi	Leonardit
Oretildiği Ülke (Türkiye Veya İthalat)	Türkiye
Beyan edilen özellikler	
Organik Madde %	45
Toplam (Humik + Fulvik) Asit %	40
Maksimum Nem %	35
pH	3.5
Ürünün garanti edilen net ağırlıkları veya hacimleri	1-2-5-10-15-20-25-30-40-40 Kg
Diğer İşaretler	Çocuklardan Uzak Tutunuz
Veriliş Nedeni	İlk Defa
Bu belge 05/11/2018 tarihinden itibaren 5 23.02.2018 Tarihii ve 30341 Sayılı Resmi	

Ali Metin KAYCIOĞLU Genel Müdür a. Daire Başkanı

TARIM VE ORI Bibisel Oretim	C MAN BAKANLIĞI Genel Mödinöğü ICI ÜRÜNLER TESCIL BELGESI RİVERIM KOMPOST VERMİKOMPOST
Ficari Unvani	TARIM HAYVANCILIK MAKINA SAN.VE TIC.LTD.ŞTİ.
Lisans Türü(Üretici veya Üretici(İthalatçı))	Úretici
isans No	1230
Ürünün	
fürü	ORGANİK TOPRAK DÜZENLEYİCİ ÜRÜNLER
Tip İsmi	Karışım Toprak Düzenleyici Gübre
Cinsi	Kati
Verilen Tescil No	11737
Marka veya Ticari Adı(varsa)	Rivonardit
Ambalaj Üzerindeki İşaretlemeler	
Firmanın Ticari Ürıvanı veya Kısa Adı	RIVERM KOMPOST VERMIKOMPOST TARIM HAYVANCILIK MAKINA SAN.VE TIC.LTD.STI.
Tip İsmi	Karışım Toprak Düzenleyici Gübre
Üretildiği Ülke (Türkiye Veya İthalat)	Türkiye
Beyan edilen özellikler	
Organik Madde %	50
Toplam Azot %	2
Suda Cözünür K2O %	1
Toplam (Humik + Fulvik) Asit %	40
Maksimum Nem %	20
pH	3,5-5,5
Ürünün garanti edilen net ağırlıkları veya hacimleri	1-2-5-10-15-20-25-30-40-50 Kg
Diğer İşaretler	Çocuklardan Uzak Tutunuz
Verilis Nedeni	lik Defa
Ru balan 05/11/2018 tarihinden itibaren 5	yıl için geçerlidir.
23.02.2018 Tarihli ve 30341 Sayılı Resmi Organik, Mineral ve Mikrobiyal Kaynaklı G	Correto'de vevolenen "Tarımda Kullanılan

#### COMPOST AND VERMICOMPOST Production Facility Project Presentation



Frat III	5
Metin KAYCIOĞL Genel Müdür a. Daire Başkanı	υ

ürü	ORGANOMINERAL ÜRÜNLER
ip İsmi	NPK' II Sivi Organomineral Gübre
insi	Sivi
erilen Tescil No	11718
tarka veva Ticari Adı(varsa)	Rivo's Ranch Sivi
mbalai Üzerindeki İsaretlemeler	
irmanın Ticari Ünvanı veya Kısa Adı	RIVERM KOMPOST VERMIKOMPOST TARIM HAYVANCILIK MAKINA SAN.VE TIC.LTD.STI.
ip Ismi	NPK' II Sivi Organomineral Gübre
retildiği Ülke (Türkiye Veya İthalat)	Türkiye
eyan edilen özellikler	
rganik Madde %	40
oplam Azot %	8
monvum Azotu %	3
ire Azotu %	5
oplam P2O5 %	10
uda Çözünür P2O5 %	10
uda Çözünür K20 %	6
oplam (Humik + Fulvik) Asit %	5
Aaksimum Klor %	1
Aaksimum EC (dS/m)	40,95
н	4-6
İrünün garanti edilen net ağırlıkları veya acimleri	1-3-5-7-10-20-25-30-50 Lt
Diğer İşaretler	Çocuklardan Uzak Tutunuz
/eriliş Nedeni	İlk Defa
u belge 30/10/2018 tarihinden itibaren 5	vil için geçerlidir.
3.02.2018 Tarihli ve 30341 Sayılı Resmi Organik, Mineral ve Mikrobiyal Kaynaklı G	Sazete'de yayılanan "Tarımda Kullanılan übrelere Dair Yönetmelik" Tarih: 30/10/201

Aynan GÜNERİ Genel Müdür a. Daire Başkanı V.

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# **SECTION 1**

Things To Consider in The Facility Installation

#### Things To Consider in The Facility Installation:

- Growth (capacity increase, etc.)
- Transportation
- Raw material supply opportunity
- Environment and conditions
- Appropriate infrastructure
- Slightly sloping terrain
- Flood risk etc.

## **1.1. WORM FORAGE PRODUCTION UNIT**

- \* The decomposition of plant and animal wastes in a humid-oxygenatedenvironment into organic fertilizers is called composting
- Worms feed by eating rotten waste.
- Composting (rot) isn't worm bait.
- \* It is formed by the aerobic decomposition of organic substances by microorganisms
- \* Under controlled conditions.
- Microorganisms such as bacteria and fungi also; produce carbon dioxide, water, heat, minerals and organic matter by burning organic compounds.
- \* In this process, the temperature rises and pathogens (disease-causing microorganisms), weed seeds and harmful insect species are destroyed.

#### Highlights of the Composting Process:

- C/N ratio (average 30%): For growth and microbial activity
- \* Sufficient oxygen: For the aerobic organism
- Humidity level: For aeration effect
- \* Appropriate temperature
- \* Appropriate environmental conditions

#### 1.1.1. WASTES TO BE PROCESSED IN THE FACILITY (Raw Material)

- \* It is foreseen to use 70% (usually) cattle manure and 30% organic waste in the forage facility. (This ratio varies according to the carbon nitrogen ratio).
- The physical and chemical properties of the cattle manure to be used in the facility are shown in table 1.

**Table 1.** Properties of cattle excrement passed through the separator to be used in the forage facility

PARAMETER	CATTLE MANURE	
Dry Matter (%)	14	
Organic Dry Matter (%)	85	
N [%]	2,6	
С [%]	40	

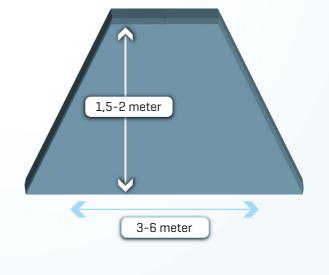
- \* If the daily manure production of a cattle is calculated as 0.029 tons and it is assumed that there are 600 cattle on your farm: 600x0,029= 17,4 t/day
- In this case, 17.4 tons a day of cattle feces will be used.
- \* The collectability ratio of manure from cattle has been accepted as 1/2. The coefficient of gathering depends on the duration of the animals in the barn, the time the feces pass to the facility and the climatic factors.
- The dry matter ratio of cattle excreta was evaluate as 14%.

Table 2. Characteristics of the cattle manure to be used in the forage facility						
	Number of Animals	Daily Waste Generation (t/day)	Daily Waste Generation (t/day)	Collectable Fertilizer Amount (t/day)	Fertilizer Collected in 60 Days (t/60 days)	KM of Material Collected in 60 Days (t/60 days)
Cattle Feces	600	0,029	17,4	8,7	522	73,08

\* The content of 30% domestic organic wastes to be used in the forage facility consist of green wastes (domestic organic wastes, gras, tea, coffee grounds, etc.) and brown wastes. (sawdust, paper, cardboard, etc.).

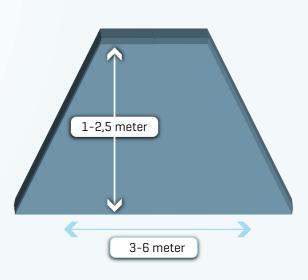
#### **1.1.2. CREATING A STACK**

- \* 8.7 tons of separated manure can be obtained from a cattle farm with 600 heads per day.
- days.





\* The forage formation process will be carried out in heaps and the waiting time in heaps will be around 60



#### **1.1.3. FORAGE PRODUCTION**

- \* The forage production process will be carried out on the concrete floor. The concrete floor can be expanded according to the required capacity.
- Drainage channels will be established on the concrete floor for the evacuation of leakage water.
- \* The piles placed on the ground will be regularly mixed with the forage mixing machine and aeration will be provided. When necessary, it will be moistened for the continuity of the microbiological process.
- Stack mixing will be done every day for the first week. It will be performed 2 or 3 times a week in the ongoing process.
- \* It is necessary to have a water tank in order to control the humidity during mixing.
- \* After 60 days of processing, it is planned to produce 4-6 tons of ready-to-use compost from 7-8 tons of bovine manure passed through a separator.
- \* The facility area (concrete section) to be used can be evaluated as 800 or 1,000 m2.
- \* In this case, the shape and length of the stack can be 25-50 m (optionally), the stack width can be 3-6 m. The distance between the line lengths should be such that the equipment to be used for mixing can pass.
- There must be a tractor and front loader at the facility in order to create the stack. (Figure 2)
- \* A compost mixing machine must be located in the facility in order to mix the stack at the proper ratio . (Figure 3)



Figure 2. Tractor and a front loader to be used in the forage facility



#### **1.1.4. INDOOR SYSTEM**

- in terms of space savings. (Figure 4)

**NOTE:** It isn't recommended to use this system in forage production. It can be used mostly for compost production.

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## **1.1.5. RESTING ON AIR FORAGE**

\* Since the reaction doesn't end completely, the forage with a high temperature should be kept until it cools completely (no smoke). It is recommended to cover the forage pile with canvas.

Forage Content:

	REASONABLE RANGE	PREFERRED RANGE
C/N	20:1-40:1	25:1-30:1
Moisture Content	%40-65	%50-60
Amount of Oxygen	>%6	%16-18,5
рН	5,5-9	6,5-8,5
Temperature	40-60	55-60
Particle Size	5 cm	Changeable

- \* C (carbon) and N (nitrogen) are essential and important nutrients.
- \* During forage production, microorganisms use carbon for energy and growth, and nitrogen for protein and reproduction.

**Carbon Source:** 

852:1 563:1 442:1 80:1 35:1

#### Carbon-Nitrogen Ratio Nitrogen Source:

Horse Manure	852:1	Newsprint	
Pig Manure	563:1	Cardboard	
Cattle Manure	442:1	Sawdust	
Grass Clippings	80:1	Leaf	
Vegetable Waste	35:1	Vegetable Waste	





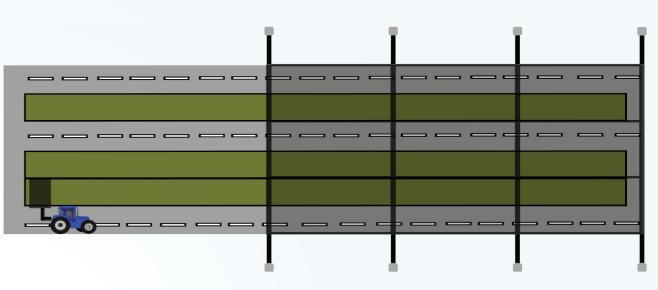


Figure 5. Sample Compost Facility Drawing (See Appendix: 1 and Appendix: 2)



#### COMPOST AND VERMICOMPOST Production Facility Project Presentation

RİVERM







**Production Facility** 



### 2.1. VERMICOMPOST PRODUCTION FACILITY

#### 2.1.1. RESTING ON AIR FORAGE AREA

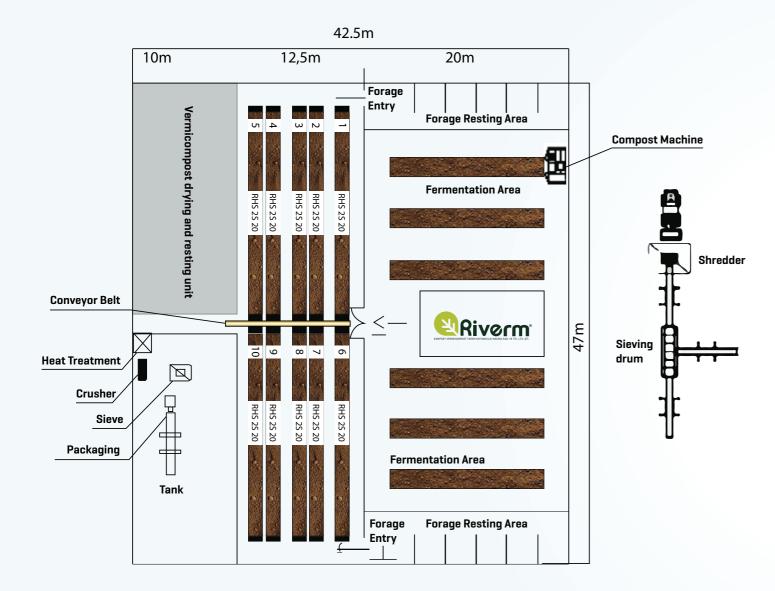
\* The worm bait is taken to the resting area to be kept in a hygienic environment until it cools down to be given to the worms.

#### 2.1.2. WORM AND VERMICOMPOST PRODUCTION AREA

- \* In the production area of worm and vermicompost, which is designed separately from the holding room, in 10 20 m Vermicompost Harvesting Systems (Rivo's Harvesting System RHS-2S/20),initially 250,000 to 375,000 adult worms are foreseen for each bed.
- \* The number of production systems can be increased according to the need. (See Appendix: 4) 2.1.3. FEEDING
- \* A mixture of semi-rotted (fermented) cattle excrement and a certain amount of domestic waste (we call it worm forage) is given to the beds at certain periods for 90 to 120 days to forage the worms and ensure that the beds are fully filled.
- \* The amount of forage to be given in this process is estimated as 15 to 17 tons for each Vermicompost Harvesting System (Rivos's Harvesting System RHS-2S/20).
- \* At the end of 90 to 120 days, the Vermicompost Harvesting System will be harvested from below and the first crop will be taken (Necessary training on this subject will be given by us.)As the first harvest, around 1 to 2 tons of vermicompost will be obtained.
- \* In the following periods, 2 feedings and 1 harvest will be done every week and around a thousand kilograms of vermicompost will be obtained from each bed .



TECHNICAL DETAILS AND STANDARD SPECIFICATIONS			
Producer	Rivo's Technics		
Model	Rivo's Harvesting System (RHS-X)		
Blade	Laser cut (Chain-lifted monobloc)		
Chain and Equipment	Double-sided traction system with fertilizer isolation		
Board Specifications	Electronically controlled; digital temperature and		
	moisture measurement; light and sound warning		
Security	Three emergency stop buttons		
STRUCTURAL SPECIFICATIONS			
Skeleton	Welded metal profile		
Side Plates	PPM plastic		
Design	3D CAD-based modular; multiples of 2.5 m		
Sizes Between Outer Sides (RHS-2S/20)	13 m (w) x 20.9 m (l) x 1.2 m (h)		
Colour	RAL 6005 moss green		
CAP	ACITY		
Suggested Initial Worm Capacity (RHS-2S/20)	250,000		
Full Worm Capacity (RHS-2S/20)	1,000,000		
Total Vermicompost Capacity (RHS-2S/20)	18.5 cubic metres (±10%)		
First Harvest	Within 3 to 6 months		
Monthly Vermicompost Capacity (RHS-2S/20)	4.5-5 metric tonnes (moist)		
OPTIONA	LFITTINGS		
Conveyor Belt	41-m long (RHS-X/20), 2.5-mm thick rubber		
	coating		
Board Specifications	Remote monitoring, remote control through		
	computer and mobile phone, PLC touch screen,		
	temperature and moisture control system		



#### 2.1.4. FEEDING

- \* The forage obtained from decomposed cattle feces is given to the beds at certain intervals for 120 to 180 days, ensuring that the worms are fed and the beds are filled.
- \* In this process, the amount of forage has been estimated as 15 to 17 tons for each system (Rivos's Harvesting System RHS-2S/20).
- \* At the end of 90 to 180 days, the worm bed will be harvested from below and the first crop will be taken.(Necessary training on this subject will be provided by Riverm Ltd.) As the first harvest, around 1 to 2 tons of vermicompost will be obtained.
- \* In the following periods, 2 feedings and 1 harvest will be made every week and around one and/or two tons of vermicompost will be obtained from each bed.

**Note 1:** Based on 38 weeks (first 14 weeks preparation and feeding period) at the end of the first year, approximately 38x1.5 tons = 57 tons of vermicompost will be obtained from a 20 m worm bed. If we start with 375,000 worms in the first year, considering the deaths and births, it is predicted that the number of worms in the bed will reach full capacity and the number of worms will increase to around 1,000,000.

**Note 2:** For the second year, around 78 tons of vermicompost will be taken from the same worm bed and since the number of reproducing worms will increase, the old worms will be trapped and taken out, and left to the culture beds for the continuation of reproduction.

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## **3.1. HEAT TREATMENT - DRYING**

#### **3.1.1. HEAT TREATMENT**

- \* Putting Heat Treatment at the exit in the resting room of the facility is by the relevant legislation of the Ministry of Agriculture. In other words, the product should be kept at 70 degrees for 1 hour in Heat Treatment in a clean area before entering the packaging.
- \* Our recommendation is to apply this application to the semi-fermented worm forage so that the forage will have a range of pathogens and be free of weeds or seeds etc.
- \* Heat Treatment capacity is recommended as 500-1000 kg. [Figure 7]



т	
Producer	Rivo's Te
Model	Rivo's Tr
Oven Net Dimensions	1.500 x 3
Oven Outer Dimensions	1.850 x 4
Oven Max. Operating Temperature	75 °C
Oven Power	380 V 10
Oven Inner and Outer Coating	Galvaniz
Product Capacity	(~) 500 ·
Control	PLC Rec
Electric Control Panel	lt is mou
	by an ele
	compute
	setting t
	probes f
	for oven
	between
	probes o
Heating the Oven	Air is blo
	inside th
	on the s
	be place
	a pressu
	generati
	oven doo
	the cent

Figure 7. Heat treatment machine to be used in vermicompost facility

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#### DETAILS

echnics

Fray Heater (RTH-1)

3.750 x 1.500 mm (± 20 mm)

4.250 x 2.250 mm ± (50 mm)

#### LOO kW

zed Slab

- 1.000 kg / hour

cord Control System

punted on the oven. Temperature control is provided lectronic digital display thermostat. PLC system and ter connection are made. There is a timer that allows the heating time inside the oven. There are two heat for the oven heat system. While the first probe is n temperature control, the second probe is placed en the material in the tray. [Optionally, the number of can be increased.]

own between each shelf. There is a shelf system he oven. There are 10 compartments and 50 trays shelves. Each shelf can carry 100 kg and 5 trays can ed. Heat is supplied to the interior of the furnace in urized manner through the steam system (steam tor). Heat is protected by an insulation system. The por is insulated on both surfaces and locked from tter.





#### 4.1. RESTING - PACKAGING - STORAGE

#### 4.1.1. RESTING AREA

\* The vermicompost obtained is taken to the holding room which is designed separately from the production room and it is kept here for approximately 30 to 60 days (until the humidity reaches the maximum level of 35%), the moisture is tried to be removed.

#### 4.1.2. CRUSHING AND FERTILIZER MILL (& SIEVE)

\* The particle size of the product is reduced by taking vermicompost, which is rested and freed from excess moisture, into the crushing unit.





#### SEMI WET METERIAL CRUSHER

#### TECHNICAL DETAILS Capacity: 1ton/h Voltage: 380 kW Engine: 5.5 kW 3000rpm Packing in Wooden Case (Dimensions) 620mm X 1580mm X 1830mm / 245 kg

#### CRUSHER

TECHNICAL DETAILS Capacity: 1.5 tons/hour Voltage : 380 kW Engine : 5.5 kW 1500 rpm

#### 4.1.3. SIFTING UNIT

 Vermicompost with reduced particle size is passed through 0-3, 0-5 mm drum or vibration sieve.

#### 4.1.4. PACKAGING UNIT

\* The vermicompost, whose all production processes are completed, is transferred to the packaging unit for filling in the desired weight or volume.

#### 4.1.5. STORAGE UNIT

\* The properly packaged vermicompost is transferred to the storage unit ready to be put on the market.

#### ! Issues to be Considered During Production:

- \* Adjusting the humidity of the manure passed through the separator during composting
- \* Ensuring the C / N ratio
- It is necessary to apply a healthy heat treatment
- <sup>6</sup> Minimizing the risk of pathogen contamination after the heat treatment process
- Ensuring proper humidity in bedding systems
- \* Providing the temperature
- \* Providing proper pH
- \* The number of worms should be proportional to the size of the worm bed.
- \* Appropriate and periodic feeding should be done
- \* The desired moisture should be caught after cutting
- \* Adjusting the particle size before packaging
- Storage should be suitable



Figure 9. Packaging unit to be used in vermicompost facility



(Worm Fertilizer)



RİVERM

#### 5.1. VERMICOMPOST (Worm Fertilizer)

#### **5.1.1. PROPERTIES OF VERMICOMPOST**

- \* It is a highly productive type of fertilizer obtained from the excrement of worms such as Red California and European Nightcrawler, which are fed with bovine droppings and certain amounts of organic wastes.
- \* It resembles black soil and is odorless.
- \* It contains all the enzymes required for the development of the plant, soil antibiotics, vitamins and growth hormones.
- \* Due to it is organic, it contains 5 times more nitrogen and potassium, 7 times more phosphorus and 2 times more calcium than chemical fertilizers.
- \* It contains about 40 million microorganisms per gram. The most important are : Azotobacter, Clostridium, Nitrobacter, Nitrosomonas, and nitrosococcus.
- \* It doesn't contain any chemicals.
- \* It doesn't have any toxic effects on plants, animals and humans.
- \* Absolutely free of pathogenic substances, parasite eggs, weed seeds and heavy metals.



# 5.1.2. BENEFITS OF NATURAL VERMICOMPOST

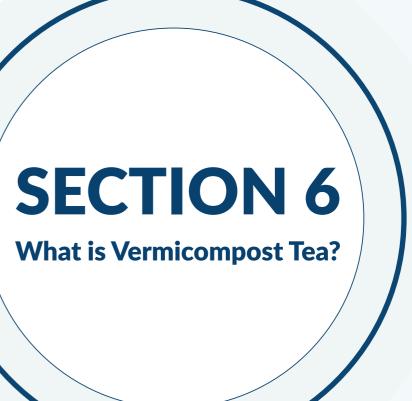
- \* It ensures the continuity of sustainable agriculture by enriching and revitalizing the soil in organic matter care.
- It is an organic product that regulates the pH balance, biological and physical structure of the soil.
- By increasing the water holding capacity of the soil saves up to 40% of water and thus greatly reduces the risk of erosion.
- \* When used regularly, the improvement process of the chemicals in the soil begins rapidly.\* By balancing the micro and macro elements in the plant, accelerates the productivity and crop efficiency and increases the product yield up to 70%.
- \* It positively changes the color and flavor of the plant by increasing the nutritional value of the plant. In this way, it provides safe, natural and ecological products.
- \* It increases the plant's resistance to frost and protects from disease.
- \* It prevents the contamination of underground water by keeping the washable plant nutrients by organic substances.

#### COMPOST AND VERMICOMPOST Production Facility Project Presentation









## **6.1. WHAT IS VERMICOMPOST TEA?**

Vermicompost tea is the transfer of the extract and microorganisms in the worm fertilizer to the water.

#### Includes:

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- \* Enzymes and amino acids
- \* Bacteria, fungi, protozoa (unicellular organisms) and beneficial nematodes
- \* There are water-soluble nutrients and organically bound nutrients.

#### **6.1.1. BENEFITS OF VERMICOMPOST TEA**

- \* These beneficial microorganisms and nutrients nourish and strengthen the plant .
- \* It protects the roots and leaves of the plant against pests thanks to the bio-film layer formed on the plant.
- Increases the feeding power of the plant and the yield of the crop.
- \* It increases the drought resistance of the plant and reduces water use.
- It regulates the soil and helps it return to its natural structure.
- \* It increases the water-holding capacity of the soil.

!Note 1: The number and diversity of microorganisms depend on the quality of the vermicompost and tea machine used. If this system isn't used, the extract and microorganisms in the worm manure cannot pass into the water, cannot reproduce and survive.

!Note 2: It can be applied easily with drip irrigation, sprayer or back pump. Owing to the filter system, all particles and residues are collected and don't cause clogging.

#### 6.1.2. VERMICOMPOST TEA MACHINE OF (Rivo's Compost Xtractor) **TECHNICAL SPECIFICATIONS**

- \* With its high-quality stainless steel structure, it is suitable for long-term commercial use. It is the most advanced system among the existing systems.
- Owing to its design, it is easier to use and clean than other methods.
- \* Business doesn't require power, the whole process can be performed by one person.
- \* Owing to its durable structure and engine, it can work 24/7.
- \* The electrical system is designed for city electricity suitable and can be used anywhere.
- \* It is designed for maximum efficiency. 7.5 kg of worm manure is sufficient to produce 850 liters of Vermicompost Tea.



Figure 10. Vermicompost Tea Machine

TECHNICAL DETAILS		
Producer	Rivo's Technics	
Model	Rivo's Compost Xtractor (RWC-2)	
Pipe Parts	PPRC Plastic Pipe	
Reducer	220 V	
Panel and Resistance	Optional	
Transfer Pump	Adblue Pump	
Framework	Aluminum Profile	
Warranty Period	8 Months	

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# **SECTION 7**



#### **7.1. WHY WORMS?**

- \* The first and most important reason why it is preferred in fertilizer production is that its digestive systems are much simpler and smaller than all other living things. Because the smaller the digestive system, the better fertilizer is obtained. This is one of the factors that make worm compost even more advantageous than barn manure.
- Other reasons are that they consume forage quickly, multiply and easily adapt to their environment.
- The feed that comes out of the worm's rectum is in the form of small granule coprolites. Coprolites contain humic substances that improve the aeration and water retention of the soil and increase its productivity by regulating its structure. Coprolites are also a source of continuous replenishment of fresh microbe generations of soil micro fluorine and a center of microbiological activity.
- They progress by digging the soil and eating organic materials (plant and animal residues, soil bacteria, fungi, etc.) that are scattered in the soil. Thus, they enrich the soil in terms of organic matter and produce fertilizers with completely organic structures.
- Earthworms increase the growth of cereal crops by 39%, seed yield by 35%, and the nitrogen content of the seed by 12%.
- In the greenhouse studies, it has been determined that they significantly affect the plant yield and increase the quality of wheat and clover.
- It has been demonstrated through experiments conducted in both laboratory and field conditions that earthworms support plant root development, significantly reduce the rate of root diseases, increase the quality of grains with meadow and crop yields (for example, protein content).



7.1.1. RED CALIFORNIA WORM (Eisenia Fetida)

- \* They can produce up to 55% of their body weight. 2000 worms can produce an average of 1 kg of fertilizer per diem.
- An average of 20° C is the ideal temperature for fertilizer production and reproduction. The optimal humidity required is 75% to 85%.
- \* When suitable conditions are provided, they can live for an average of 5 years.
- The number of adult worms increases approximately 10-20 times after 1 year.



#### 7.1.2. EUROPEAN NIGHTCRAWLER WORM (Eisenia Hortensis)

- \* This worm species is also known as Dendrobaena Veneta.
- It is highly resistant to ambient conditions, especially cold. For this reason, it is the most preferred type of worm by fishermen to hunt fish living in cold waters.
- \* 15 to 21° C is the ideal temperature for them to live, breed and produce fertilizers. The optimal humidity required is 75% to 85%.
- The most important difference from the red California worm is that when there is no forage left on the surface, they descend deep into the ground in search of forage.
- On average, they are fed as much as their own weight, grinding what they eat in a short time and turning it into fertilizer.
- provided that ideal conditions are provided.



It has an 81.2% birth success rate. Each adult worm lays an average of 1 to 3 worm eggs per week,



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