



# LIFE13 ENV/IT/000470 "ECODEATTING"

Environmentally friendly natural products instead of chemical products in the degreasing phase of the tanning cycle



## Action C2

Environmental monitoring of defatting with natural products at laboratory level.

Beneficiary responsible for implementation: Inescop, and Unifi

**Duration**  
01.10.2014 to 30.09.2016

**Total Budget**  
€ 1,035,556.00

**EU contribution**  
€ 517,778.00

The EDF formulations, based on the use of natural products and lactose derived species for the demonstration of defatting at laboratory level, were assessed for their environmental impact by monitoring the degradation of their related wastewaters. These were fully characterized and compared to similar effluents from the use of commercial products (COMs). The EDFs allowed the application of a bacteria based technology for the treatment of the wastewaters.

### Wastewaters parameters

Parameter	Method	
pH		
Conductivity at 25 °C (µS/cm)	UNE-EN 27888:1994	(ISO 7888:1985)
BOD (mg O <sub>2</sub> /l)	UNE 77004:2002	(ISO 6060:1986)
COD (mg O <sub>2</sub> /l)	UNE-EN 1899-1:1998	(ISO 5815:1983)
Biodegradability (BOD/COD)	BOD / COD	

### The Equipment



### Effluent Characterization

Formulation	pH	Conductivity	COD	BOD
EDF 1	6.4	47,500	9,100	1,596
EDF 2	6.6	48,200	10,200	1,362
EDF 3	6.7	50,700	11,700	1,874
EDF 4	6.5	125,900	14,400	1,411
EDF 5	6.3	129,500	11,800	1,647
EDF 6	6.5	68,800	9,300	1,250
EDF 7	6.7	96,500	8,300	1,190
EDF 8	6.6	103,400	8,100	995
EDF 9	6.4	92,500	8,400	1,025
EDF 10	6.7	88,300	8,100	1,940
EDF 11	6.7	72,700	8,000	1,760
EDF 12	6.9	91,200	7,900	2,020
EDF 13	7.0	69,300	7,400	1,850
EDF 14	6.8	74,800	9,300	1,930

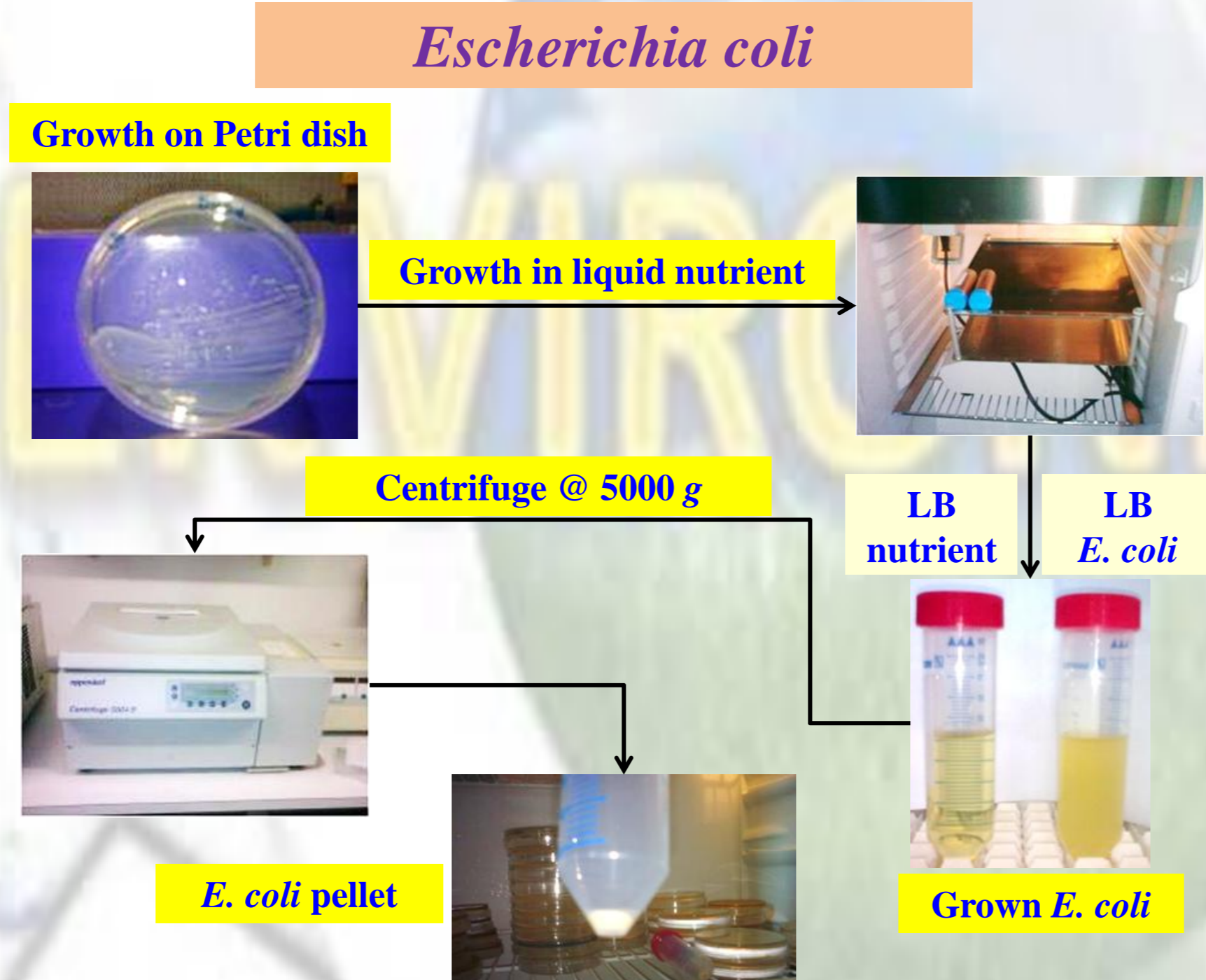
  

Formulation	pH	Conductivity	COD	BOD
EDF 15	6.8	83,500	8,800	1,770
EDF 16	7.1	87,900	8,800	1,890
EDF 17	7.0	76,200	8,600	1,820
EDF 18	6.9	75,800	9,500	2,140
EDF 19	7.1	138,500	10,000	1,700
EDF 20	7.1	135,700	10,700	1,900
EDF 21	7.0	134,500	12,300	1,900
EDF 22	7.2	128,400	7,900	2,460
EDF 23	7.0	127,100	6,300	1,940
EDF 24	6.8	126,700	7,400	1,594
EDF 25	6.6	127,400	7,200	1,494
EDF 31	6.9	70,800	7,900	1,099
EDF 33	6.9	70,300	6,770	1,999

**Coordinating beneficiary**

UNIVERSITÀ DEGLI STUDI FIRENZE

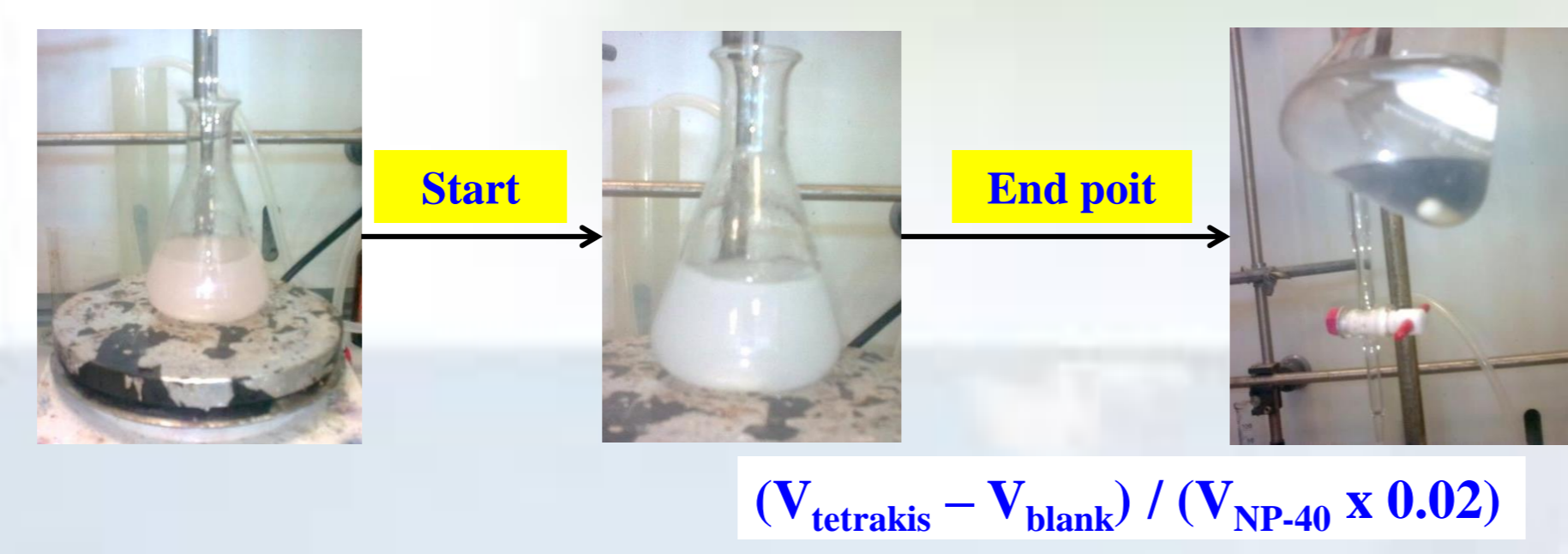
Chemical Department  
"Ugo Schiff"  
Florence University (IT)



**Associated beneficiaries**

Chemical Institute of organometallic compounds of CNR (IT)

The activity of bacteria was monitored indirectly, titrating the content of defatting chemicals.



NP-40 (20 mg) was dissolved in deionized water (1 L). An aliquot (10 ml) was diluted with water (20 ml) and made basic with KOH (1.5±0.1 g). Sodium tetrakis(4-fluorophenyl)borate·2H<sub>2</sub>O (51.8 mg) and Basic Blue 26 (0.04% w/w in ethanol) were dissolved in deionized water (250 ml). Four drops of the BB26 solution were added to basic NP-40, followed by DCE (8 ml). The mixture was stirred vigorously for 2-3 min., observing a pink color that turned purple in the organic layer at the end point.

**NEWPORT Srl**  
Newport Srl (IT)

**INESCOP**  
CENTER FOR TECHNOLOGY AND INNOVATION

**Asociación de Investigación para la industria del calzado (ES)**

### Wastewaters treated with *Escherichia coli*

effluent	before	after	biomass recycle	Δ (%)
EDF 02	0.77	0.59	0.61	23.9
EDF 05	0.86	0.69	0.68	17.1
EDF 06	1.62	1.37	1.41	15.3
EDF 07	0.94	0.75	0.75	21.1
EDF 08	1.31	1.08	1.05	18.9
EDF 09	1.53	1.33	1.27	13.9
EDF 11	0.99	0.88	0.86	11.7
EDF 12	0.95	0.72	0.76	23.8
EDF 15	1.10	0.90	0.87	19.5
EDF 16	0.83	0.64	0.62	20.8
EDF 18	0.66	0.52	0.53	19.7
EDF 19	2.60	1.99	2.03	23.2
EDF 20	3.98	3.07	3.12	23.3
EDF 21	4.60	3.65	3.60	21.2

### Wastewaters treated with *Pseudomonas savastanoi*

effluent	before	after	biomass recycle	Δ (%)
EDF 02	0.70	0.32	0.36	55.0
EDF 05	0.80	0.44	0.43	46.6
EDF 06	1.52	1.29	1.26	15.5
EDF 07	0.86	0.64	0.66	24.8
EDF 08	1.17	0.69	0.72	41.9
EDF 09	1.45	0.91	0.99	38.1
EDF 11	0.93	0.64	0.59	34.9
EDF 12	0.87	0.55	0.54	35.9
EDF 15	1.08	0.69	0.61	36.4
EDF 16	0.72	0.37	0.40	50.0
EDF 18	0.65	0.30	0.33	51.9
EDF 19	2.32	0.95	0.99	59.5
EDF 20	3.78	1.80	1.82	50.9
EDF 21	4.52	2.49	2.58	44.0

**Contact person**  
Prof. Roberto Bianchini  
Department of Chemistry  
The University of Florence (IT)  
roberto.bianchini@unifi.it

*E. coli* and *P. savastanoi* improved the environmental profile of the wastewaters and the results allowed to extend the interpretation about the environmental impact of the new EDFs: these move away from chloroparaffins, ethoxylated alkylphenols and long chain alcohols, complying with REACH to a higher extent.