BIOLYFE PROJECT

Biomass supply for second generation bioethanol production

Fabio Sissot

1st Generation Bioethanol vs. 2nd Generation

1st generation:

- Raw materials: starch (or sugars)
- Raw materials : Cereals (e.g. maize)
- Food products = commodities
- High costs of the raw material

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2nd generation:

- Raw materials: Cellulose and hemicellulose
- Raw materials: Dedicated crops,agricultural/agro-industry re (e.g. straw)
- Non-food biomass
- Lower costs of raw material

Although they are more "easy" to be used, 1st generation sources, could be less sustainable

Commodities vs. Biomass

Commodities:

- No qualitative differences on the market (cathegories are set and standardized)
- Price id fixed by the global market
- Tradeable and easily trasportable

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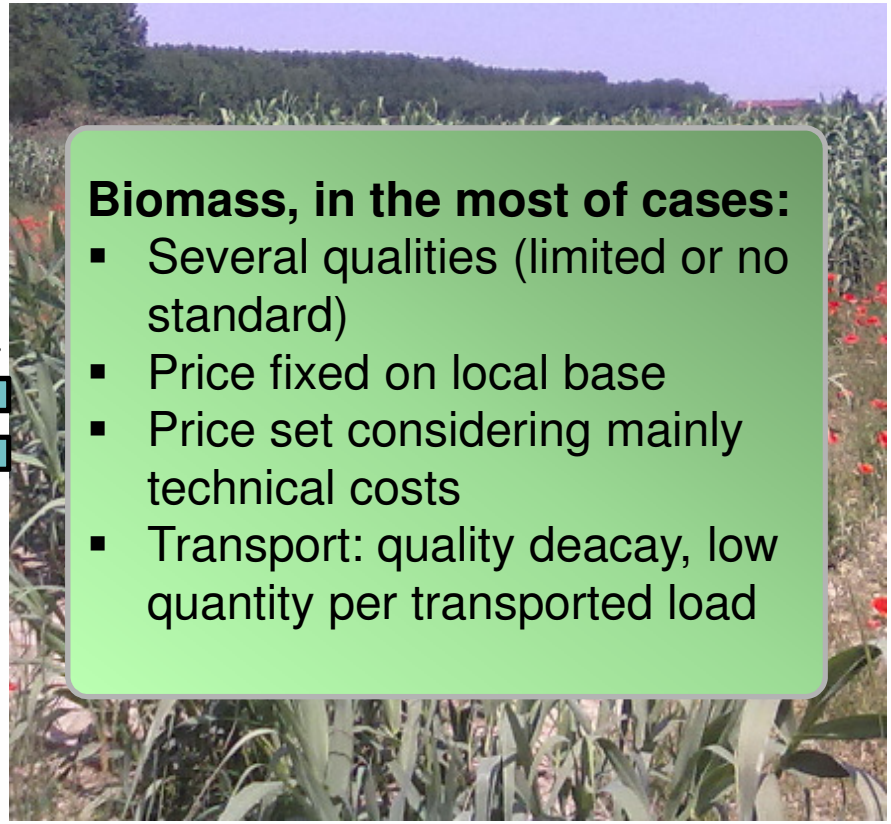


Biomass, in the most of cases:

- Several qualities (limited or no standard)
- Price fixed on local base
- Price set considering mainly technical costs
- Transport: quality deacay, low quantity per transported load

Commodities are easy to be managed but their maket is really competitive. On the other side, dedicated biomass needs more efforts about planning and logistic




Commodities vs. Biomass

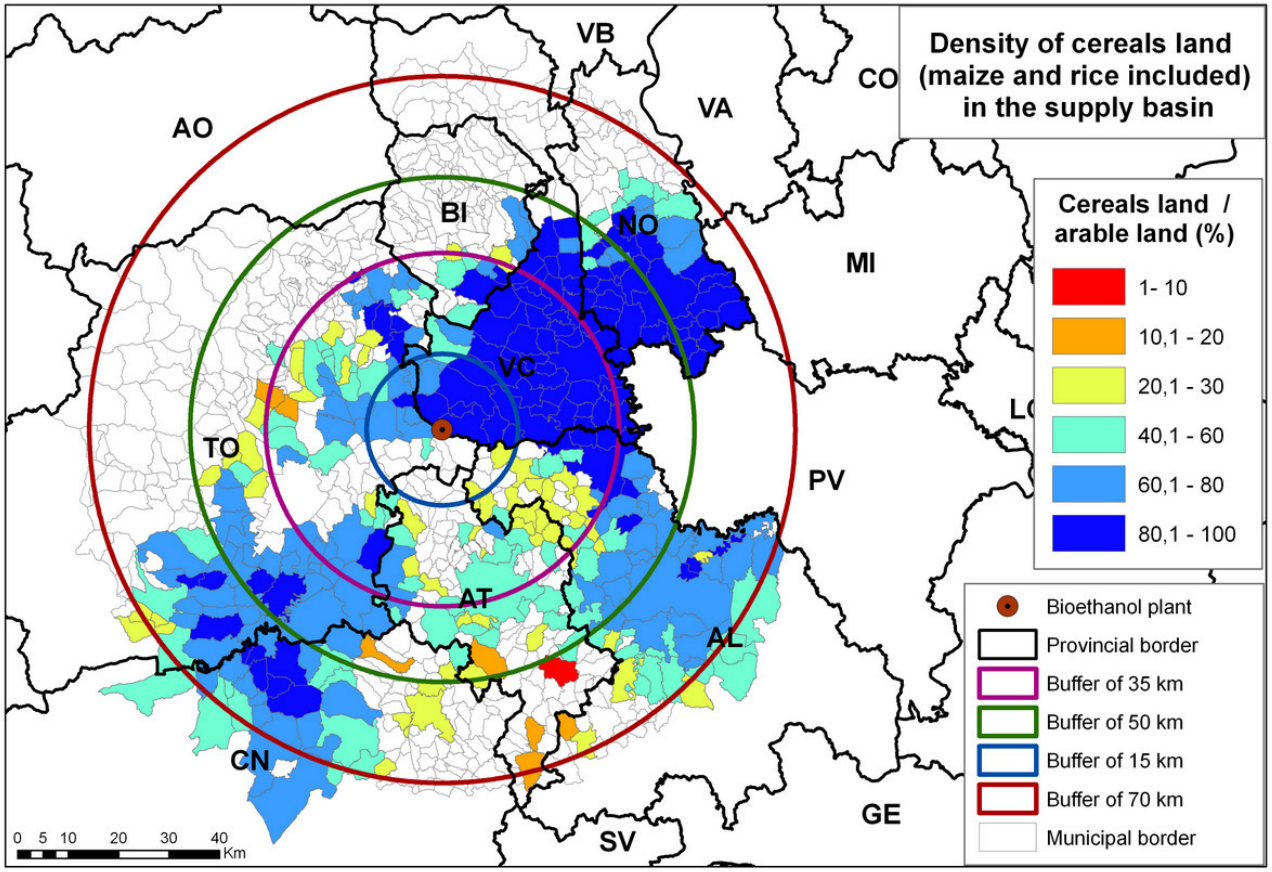
			
Storage	- Moisture < 14% - Good	- Moisture < 12% - Good	- Moisture > 50% - Low → Logistic !
Logistic	- Density > 0,75 t/m^3 - High transported value per load	- Density > 0,18 t/m^3 - High transported value per load	- Density < 0,30 t/m^3 - Low transported value per load
Handling	- Homogeneous - Easy handling and management	- Homogeneous - Easy handling and management	- Efforts for logistic management - Dry matter losses

Focused biomass residues of Byolife project




	CEREAL STRAW	RICESTRAW	CORN STALKS	CORN COBS
Tipology	(June-July)	(September or April)	(Fall August-September)	(Fall August-September)
Density	Very low	Very low	Low	Really low
Moisture	< 10%	> 20%	> 25%	> 25%
Harvesting	Well-founded	Founded	Founded	Starting
Storage	Easy	Quite easy	Not easy	Easy
Yield	2-4 t dm/ha	3-4 t dm/ha	2-5 t dm/ha	1-2 t dm/ha

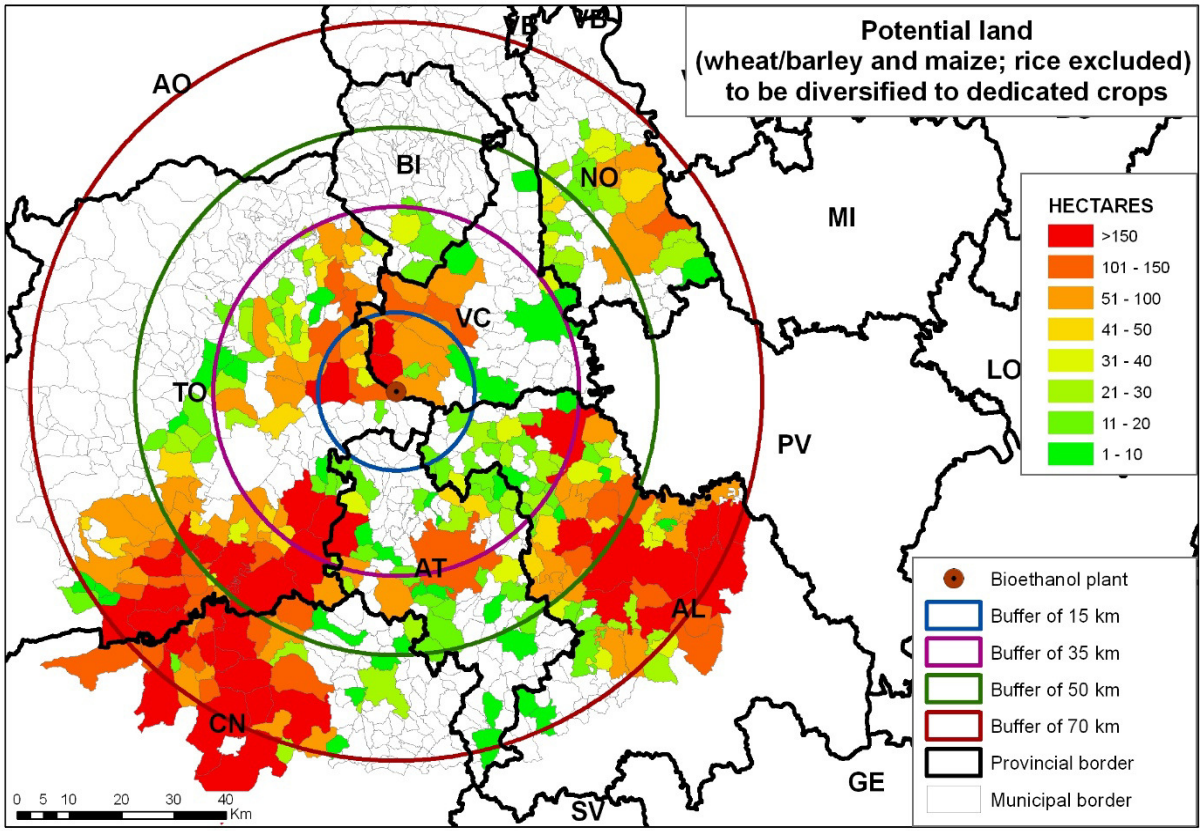
Biomass residues of Byolife project: land analysis



Focused dedicated crops of Byolife project

				
	ARUNDO DONAX	**MISCANTHUS**	**SWITCH GRASS**	**FIBER SORGHUM**
Tipology	(All year long)	(Winter)	(Winter)	(Fall August-September)
Propagation	Rhizome, cutting, micropropagation	Rhizome, cutting, micropropagation	Seed	Seed
Moisture	40-60%	15-40%	15-40%	> 50%
Harvesting	Quite easy	Quite easy	Easy	Easy/for storage needs drying
Storage	Short time	Must be dry, not easy	Must be dry, not easy	Must be dry, not easy
Yield	5-25 t dm/ha	4-20 t dm/ha	4-18 t dm/ha	3-25 t dm/ha

Dedicated crops of Byolife project: suitable land to be diversified

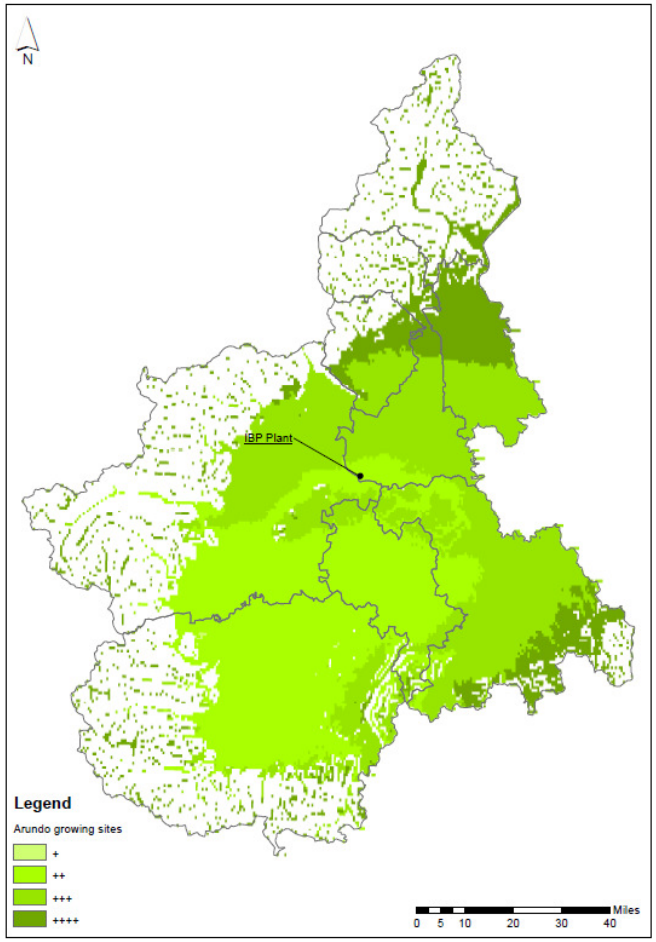


Strategies for Byolife plant supply

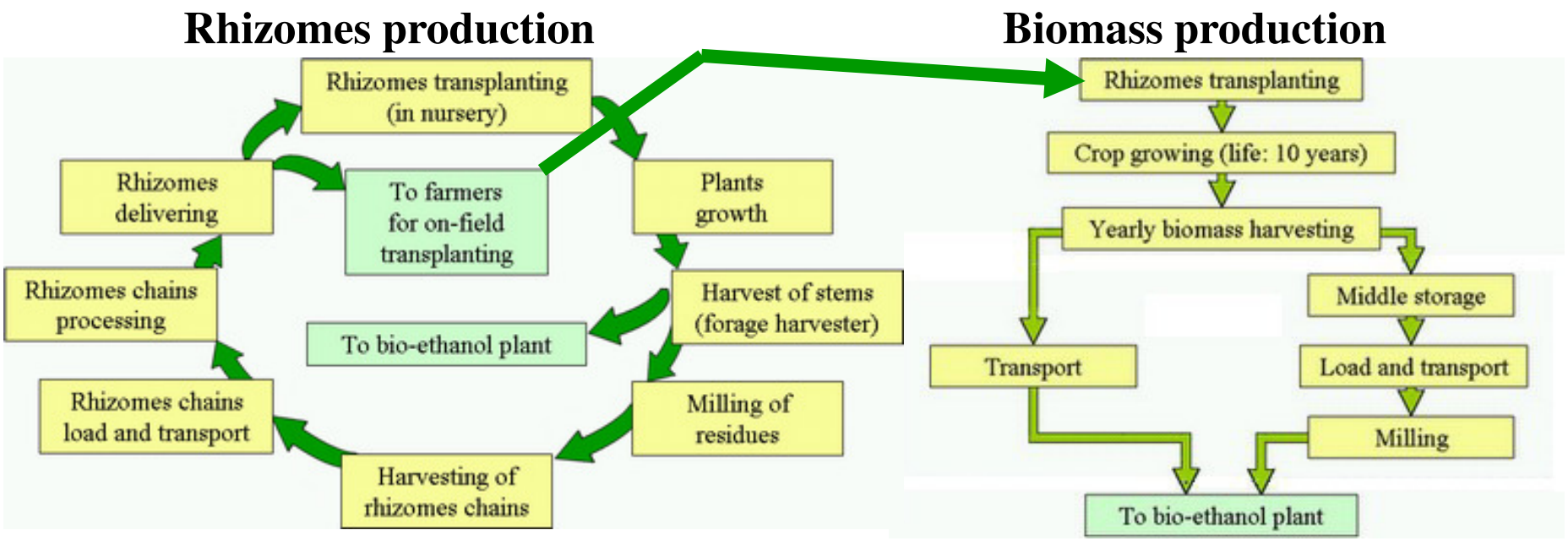
Requirements	Drivers
Technological	▪ Cellulose and hemicellulose content ▪ No inibitors ▪ Storage and degradation
Economical sustainability	▪ Yield (t/ha) ▪ Agricultural operations cost ▪ Distances and transport
Strategic plus	▪ No competition with food market ▪ Control of the chain ▪ Harvesting time ▪ Storage capacity

Water supply (growth analysis)

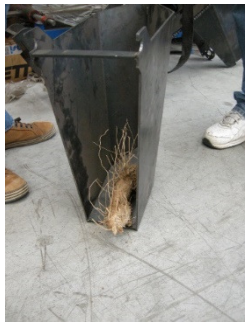
Potential growth	Water balance
+	-30% - Heavy deficit
++	-20% - Medium deficit
+++	-10% - Slight deficit
++++	0% - Balanced



Arundo donax cycle



Arundo donax cycle: rhizome propagation



3-4 ha/d depending on the rhizome cleanliness

Arundo donax cycle: rhizome processing

Rhizomes:
3000 pieces/h

Arundo donax cycle: rhizome transplanting

3-4 ha/d

Arundo donax cycle: harvesting and storage

Principles:

- the conversion plant cannot be stopped for a biomass lack
- seasonality of harvesting
- biomass in compliance with the plant specifics → storage methods: good quality of biomass and limited losses of dry matter

Thank you for your attention

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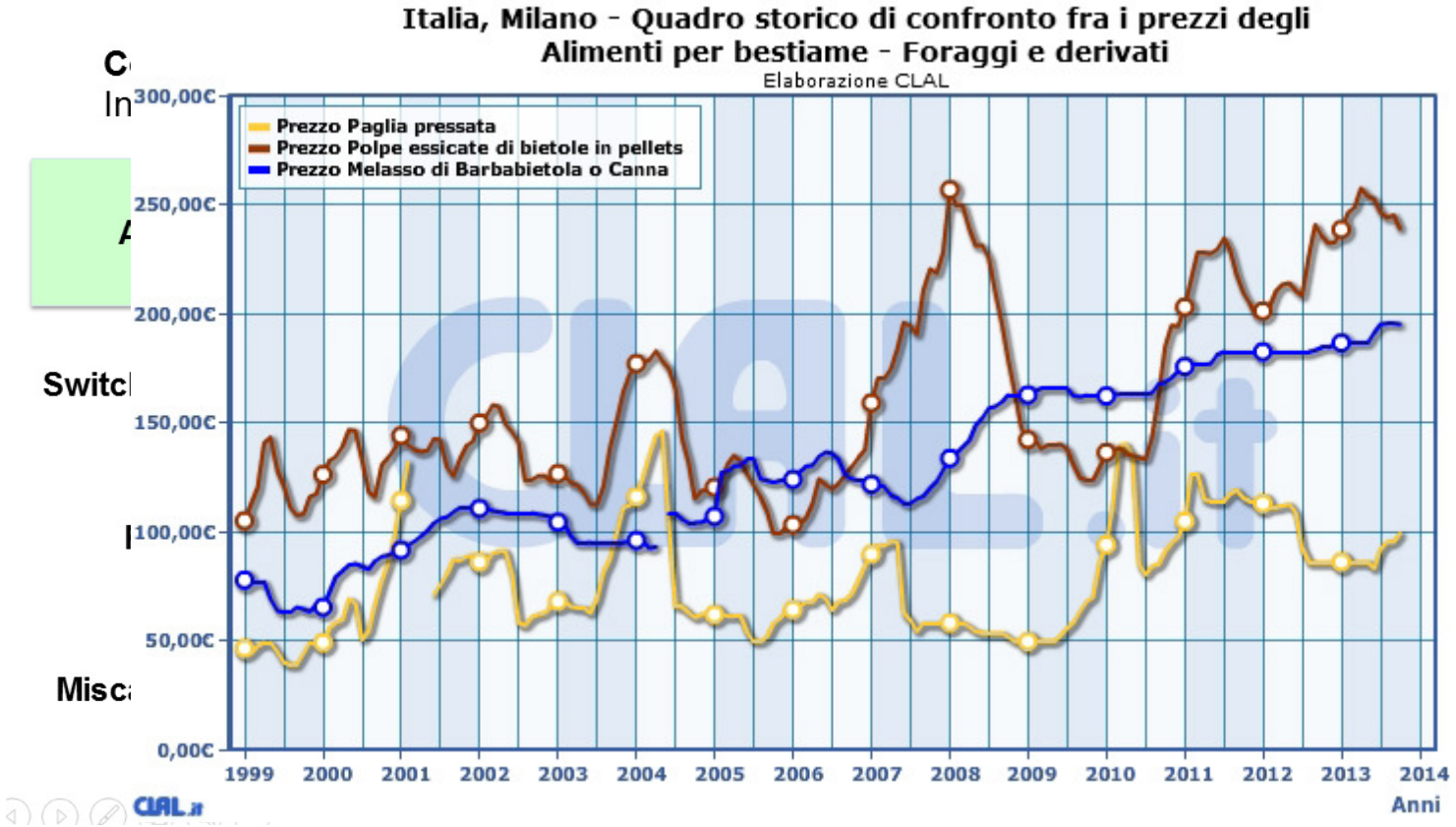
Tools


Italia, Milano - Quadro storico di confronto fra i prezzi degli
Alimenti per bestiame - Foraggi e derivati
Elaborazione CLAL
Prezzo Paglia pressata
Prezzo Polpe essicate di bietole in pellets
Prezzo Melasso di Barbabietola o Canna
300,00€
250,00€
200,00€
150,00€
100,00€
50,00€
0,00€
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