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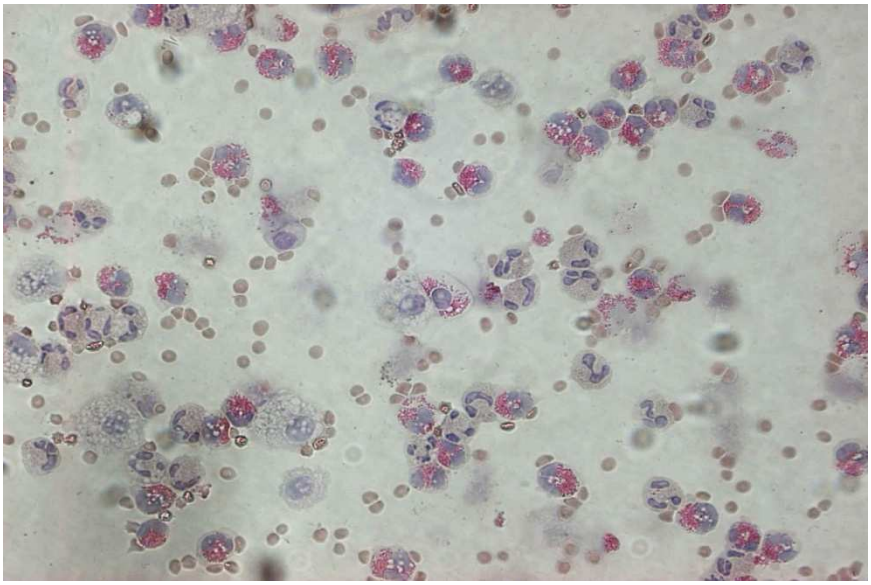

Förvaltning och produktion av massaved, en översikt över Sverige och Spanien

MANAGEMENT AND PRODUCTION OF PULPWOOD, an Overview of Sweden and Spain

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ABSTRACT

The aim of this project is compare the production of pulp and paper products between Spain and Sweden.

Today paper industry has been improved, with new uses, and the paper consumption is a regarded to be a good indicator of development in countries (FAO 2009). Two different pulp producing processes, chemical and mechanical, are the most widely used in this industry.

Spain and Sweden have a similar area, also the wood areas in these countries are quite similar; but the approaches are different, one more productive in Sweden and other more conservative in Spain. Also the different geographical situation gives different kinds of species used for paper.

Sweden is one of the largest producers in the World, whereas Spain is the 6th in Europe (FAOSTAT). These differences are mainly reflected in the productivity and in the international trade.

Key words: *Pulpwood, production, international trade, Spain, Sweden*

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1.INTRODUCTION

1.1 History

For centuries paper has been the most widely used material for drawing and writing. In the beginning the Ancient Egyptians used the fibres of papyrus, a plant that grows on the bank of the Nile, to make sheets of paper, also in Egypt they started to use parchment for writing. Paper as we know it, made from vegetal elements, was invented by the Chinese in the I Century BC. In Europe, paper arrived in VIII century, through the Muslim Spain. Since that date, the importance of paper as a mean of communication and expression has increased greatly

In 1720, the French Ferchault de Reaumur started to use wood as source of plant fibre to make paper but it was the German Friedrich Gottlob, in 1850, who started to obtain paper from the pulpwood as we do nowadays.

1.2 Definitions

Paper is a thin sheet composed by vegetal fibres obtained from wood, straw, cloths, etc., grounded, bleached and diluted in water which is then dried and harden through special procedures[1].

Paper, as we said, is made from wood fibres obtained from wood pulp The definition for wood pulp from FAO says "*Fibrous material prepared from **pulpwood**, wood chips, particles or residues by mechanical and/or chemical process for further manufacture into paper, paperboard, fibre board or other cellulose products. It is reported in metric tonnes air-dry weight (i.e. with 10% moisture content).*"

We are going to talk about pulpwood knowing that it means timber suitable for making into pulp[2].

The wood that is used for making paper should be chosen with regard to wood destiny and the method used, mechanical or chemical, because the characteristics required for one method are not the same for the other one.

In Spain, pine wood is used for the chemical method because the presence of resins and also the length of the fibres; on the other hand, eucalyptus is used to obtain mechanical pulpwood.

[1] RAE Dictionary
[2] Oxford Dictionary

1.3 Pulpwood in the world

1.3.1 Paper today

Paper is an incredible product; the range of uses is extremely vast and it is also a renewable product. It is always being improved offering new possibilities and applications.

Everything is possible with paper. You can print, write, draw on it, use it for packaging, clean, keep your staff, as well as, play, smoke, decorate... and much more! Nobody knows which uses are waiting for it in the future.

The evolution of paper knowledge and the fabrication process in the last century was highly developed making it cleaner, more environmentally friendly and energy efficient.

1.3.2 Paper production in the World

Today, the production of products correlated to paper is an important part of some economies; also the consumption of paper for a society shows the degree of development. Because the main function of the paper is as writing surface, the most famous product is the paper used for printing and writing, as we see in the figure 1 the production of this kind of paper in 2009 was more than 100 millions of tonnes. Countries as China, U.S.A and Japan are always in the top-ten of production (FAOSTAT,2011).

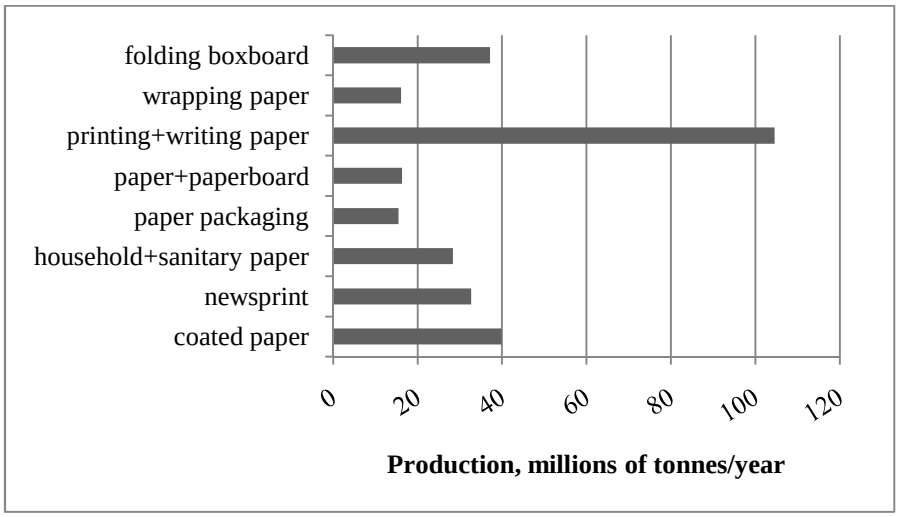


Figure 1.Production in millions of tonnes /year of some paper products in the World during 2009. (FAOSTAT, 2011)

1.4 Raw materials for paper

1.4.1 Softwood Pulp

Included in this group are coniferous trees such as pines and spruces. Characteristic of these woods are the colour and also the presence of only two kinds of cells in the wood; ray cells and fibres. These fibres are usually long (3 to 7 mm).

Softwood is not a good pulp for the mechanical process because of the presence of resins. These resins make the worst quality paper with low hardness or tearing resistance and it also ages fast turning yellow under the exposure to light. It is used for newspapers and kind of printing papers as well decorative papers.

Softwood is more often used for chemical processes bringing better quality, appearance and resistance. Depending on chemical process used a more transparent paper can be produced or paper with other special characteristics. Also, because of the additional strength of this kind of pulp, it is used for bags, boxes and shipping containers.

The figure 2 shows the production of softwood in the last ten years in the world. It is easily identifiable how the economical crisis affects the production level in 2008 and 2009.

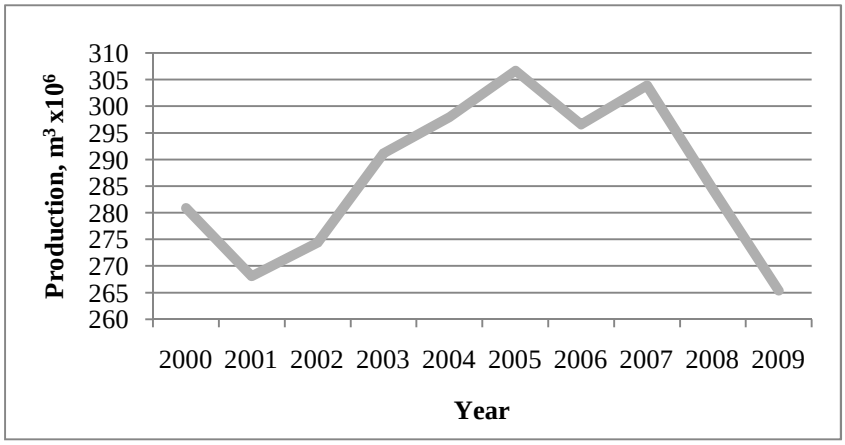


Figure 2.World's production of softwood, millions of m^3. (FAOSTAT, 2011)

1.4.2 Hardwood Pulp

Broadleaves species are included in this group; the most common for paper being the eucalyptus species. The structure of this wood is more complex with more variation in anatomy of cells as vessels and different cellular walls. Furthermore the length of the fibres is only 1 to 2 mm.

The production of hardwood is distributed along the world; the differences between both hemispheres are smaller than in the softwood production. Figure 5 represents the biggest producers of hardwood in the world during the year 2009

The pulp from hardwood species is good for producing flat, uniform appearance in papers with good properties. The papers obtained from hardwood pulp have sometimes less dynamic and static resistance than softwoods, but are the best papers for writing and printing uses.

In figure 3 we can see how the economical crisis effect appears again but in a lower scale.

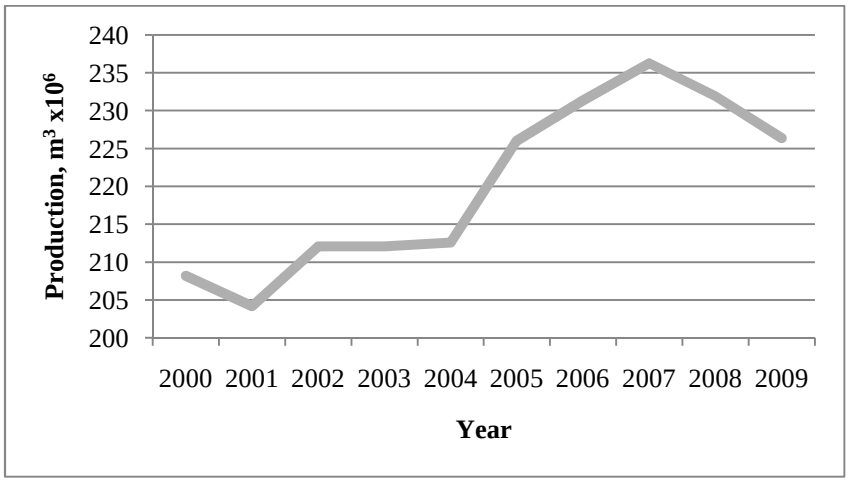


Figure 3.World's production of hardwood, millions of m^3. (FAOSTAT, 2011)

1.4.3 Other materials

Other kind of materials different than wood, can be used to make pulp, some of them, as the textile wastes, are the remains from old times and now are less used, but other materials have been developed as substitutes of wood for paper. The two main producers in the world are China and India, as we can see in the figure 7.

The FAO definition for these materials is:
"Pulp of fibrous vegetable materials different than wood. Including straw, bamboo, bagasse, esparto, other reeds or grasses, cotton linters, flax, hemp, rags and other textile wastes. Used for the manufacture of paper, paperboard and fibreboard" (FAO forestry products definitions 2010)

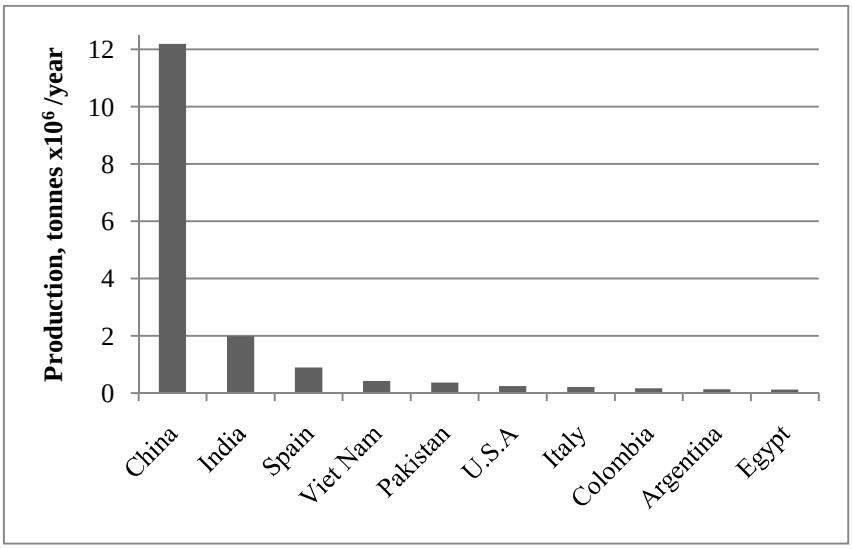


Figure 4.Biggest producers of pulp from other materials different from hardwood or softwood in year 2009, millions of tonnes/year. (FAOSTAT, 2011)

1.5 Process of pulpwood

The chemical composition of the wood is variable. The wood is composed mainly of cellulose, lignin, hemicelluloses and 5-10% of other components. Lignin is the glue of the wood and is the principal obstacle to produce a good paper; the lignin could be up to 15 to 30% of the weight of wood. Cellulose is the objective for pulp because the fibres have chemical stability, resistance, good absorption capacity and white colour.

The wood has to be treated and measured, then the bark is peeled; because the bark has few fibres, is dark coloured and has a lot of useless substances e.g. ground. The debarking could be made with water, with tools or simply rubbing stems with stems.

Once debarked, logs could be cut in pieces from 1 to 6 meters (for mechanic pulping process) or chipped (for chemical pulping process). The pieces and chips have to have a standard size to ensure a steady flow through the process. Because of this, in the beginning of the production line, some sieves are situated, the big chips will be crushed again and the smaller could be used for energy.

To make paper the wood needs to be reduced into pulp, meaning that it is necessary to separate the fibres, wash it and then screen to remove any remaining particle. Eventually, the pulp has to be bleached and refined to obtain the final paper product. Depending on the process used the pulpwood is classified. The most common pulp produced is the chemical wood pulp as we can see in figure 8, with more than 10 million tonnes in the year 2009.

1.5.1 Mechanical process

In this process, the fibres are crushed out of the wood. Most often the wood is destroyed by lubricated rotating stone or passing chips through a mill. In earlier times, the woodchips were heated to make them softer and thus make the process more efficient; this process is known as thermo-mechanical pulp (TMP). One variation of this process is when the particles are imbued with a chemical treatment; the result is a paper with more strength. Phases for this process are chipping, a mechanical shredding, washing, felting and drying. FAO includes also the semi-mechanical pulp as a mechanical pulp. The four main producers are northern countries, figure 9.

Even though the process is quite efficient (from 1 ton of dry wood 0.8/0.9 tonnes of pulp is obtained), the paper obtained is a bit weak and usually becomes discoloured when it is exposed to light. An example is the sheets of many newspapers that become yellow with time. This happens because of the presence of residues of lignin.

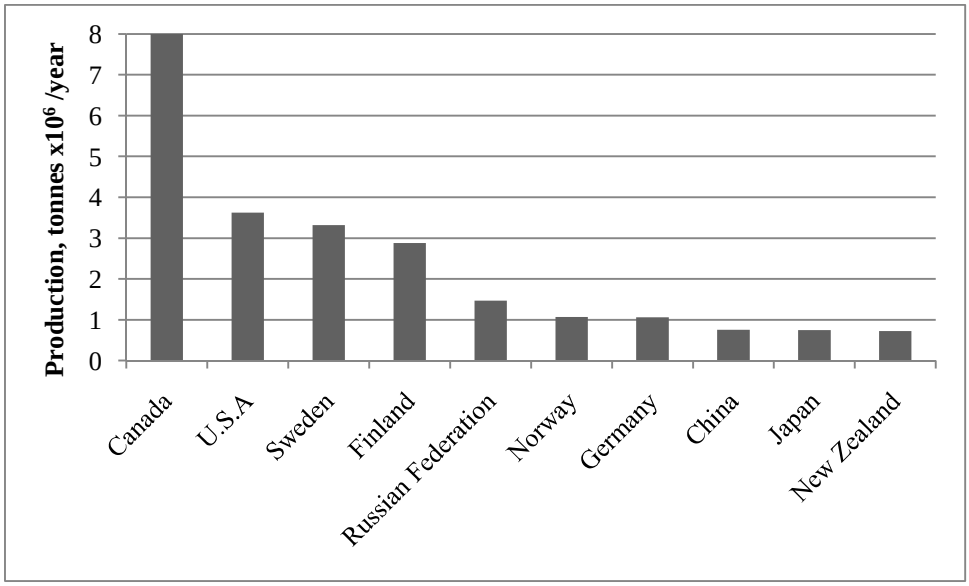


Figure 5.Main producers of mechanical pulpwood in 2009, millions of tonnes /year. (FAOSTAT, 2011)

1.5.2 Chemical process

The pieces of wood are mixed with water and chemical products and then boiled until the cellulose fibres are separated. Usually, the wood is boiled with a solution called *white liquor* which is composed of different chemical components. The resultant pulp is cleaned with water and classified to eliminate the rest of chemicals. The mix of removed chemicals is known as *black liquor*.

With a 69% of the total production (Swedish forest industries federation, 2009) this is the most common process in the world. Also getting inside the chemical processes the KRAFT process is the most used, this process uses sodium hydroxide (NaOH) and sodium sulphate (Na_2S) as *white liquor*.

In the figure 6 we can see the ten biggest producers in the world for the year 2009.

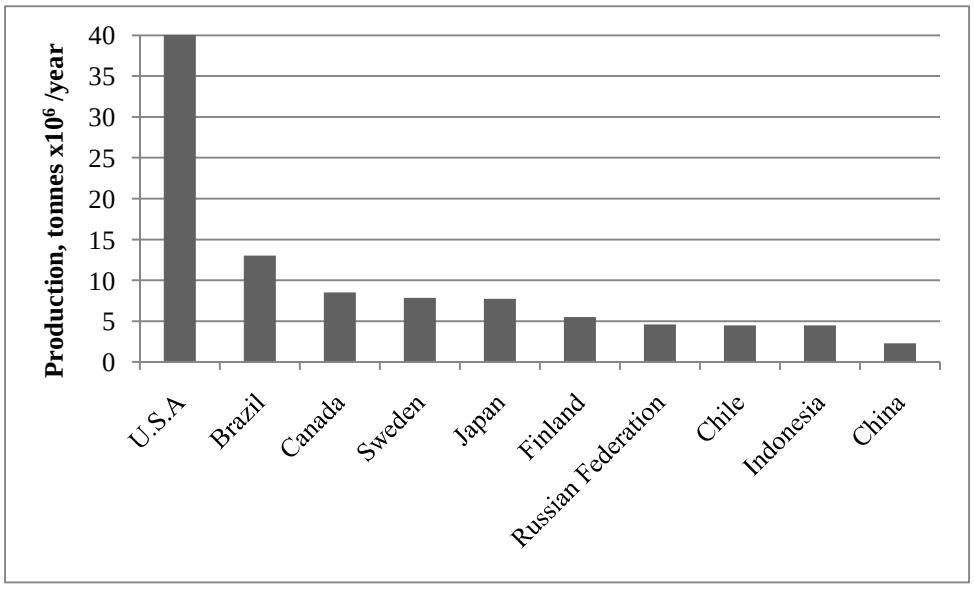


Figure 6.Main producers of chemical pulpwood in 2009, millions of tonnes /year. (FAOSTAT, 2011)

1.6 Objectives

The main objective of this project is to made a comparison between Spain and Sweden as pulpwood producer countries, focusing on:

- The productive forests in these countries
- The most common species used for pulpwood and the production of wood
- The paper and pulp industry, and it's production
- The International Trade for pulpwood of Spain and Sweden.

2. MATERIALS AND METHODS

To realize this comparison between two countries different literature has been consulted, as well some information has been gathered from teachers of the Escuela Superior de Montes of Madrid. The data shown in this project are collected from Internet Databases, the most important one is FAOSTAT powered by United Nations.

Also official reports from the Spanish government as “Inventario Forestal Nacional III” and the Swedish “Swedish Statistical Yearbook of Forestry 2010” have been used for the project.

3. RESULTS AND DISCUSSION

3.1 Spain and Sweden

These two countries are supposed to be really different since one is situated in the Mediterranean coast and the other in Scandinavia. The economy, kind of vegetation, also the management are different but the surface and the covered areas by wood vegetation are quite similar. Spain has 50 million ha surface, where 28 millions are forests and wood areas, the volume of this surface is over 888 million m^3. Sweden has 41 millions of ha as land area with 30 millions of forest and wood areas; the total volume is over 3155 millions of m^3. (Skogsstyrelsen, 2010)

3.1.1. Ownership of the forest.

The ownership of the Spanish forests is unknown due to a lot of problems since the XIX century but we can summarize the situation; with a 34% owned by the public administration and the 66% by private hands (*IFN III*,2006), the situation in Sweden is use to has more private owners than public, the distribution of the ownership in this country is 50% individual owners, 26% private owned companies, 14% state owned companies, 6% other private owners, 3% state and 1% other public owners (Skogsstyrelsen 2010).

3.2 Production forest

According to a report about the conditions of forests in the world in 2009 by FAO, the forested area in the world is declining, but in Europe the situation is different, each year the forest increases by 1.4 million hectares. Sweden, Finland and Spain have the largest forested areas in Europe (*FAO Statistics*, 2009*)*. However, the uses of the forest in these countries are different. Spain has a more protectoral view of the forest instead of the productive objective in the Northern countries.

Sweden practice production forest, the total land of this country is around 41 million ha and more than the half of this area (56%) is classified as productive forest area[1].

The most common species are Norway spruce (*Picea abies*(L.) Karst) and Scots pine (*Pinus sylvestris* L.) with the 40% and 38% respectively of the standing volume.[2]
These forests are mainly owned by family enterprises (50%) and industrial forest enterprises (26%)[3].
The major products are saw logs and pulpwood even though the pulp and paper industry requires the largest amount of wood, as we can read in figure7.

[1] Swedish Forest Federation-Facts and Figures 2009
[2] Swedish Forest Federation-Facts and Figures 2009
[3] Swedish Forest Federation-Facts and Figures 2009

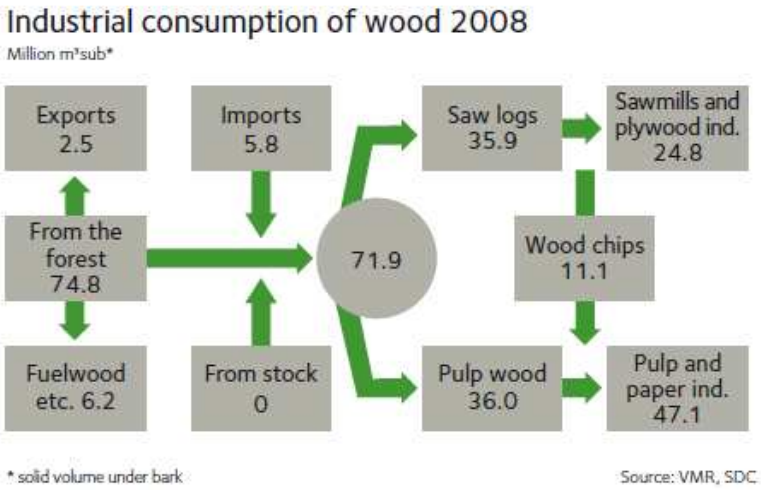


Figure 7. Industrial consumption of wood in Sweden in 2008, mill. m^3 (Swedish Forest Industries Federation, 2009)

In Spain the area covered by forest is about 18 million ha[1], which means that Spain, with 921.9 million m^3 of wood volume[2], is the 8th country in the EU-27 in forest stock. The amount of accumulated wood is increasing because, in Spain, the most common uses for the forest are environmental and recreational uses.

Focusing only on plantations, the surface area represents just 6% of the total area[3] in Spain. The volume of the two more productive species used for pulpwood in Spain, are 53 million m^3 for Blue gum (*E. globulus*) with 4 million m^3 of cutting volume, and 41 million m^3 for Monterrey pine (*P. radiata*) with 1,3 million m^3 as cut volume in 2008 (IFN3, MARM 2011).

The areas, where these species are growing are plotted with green colour in the figure 8.

Figure 8. Geographical distribution of *Eucalyptus globulus and Pinus radiata* (IFN III, 2006)

[4] Inventario Forestal Nacional 3
[2] Inventario Forestal Nacional 3
[3] MARM

3.3 Species

As we said the most common species for pulpwood in Sweden and Spain are *Eucalyptus globulus, Pinus sylvestris, Pinus radiata* and *Picea abies.* The first one is the only angiosperm used and is only used in Spain, as the Norway spruce is only used in Sweden.

3.3.1 Blue gum eucalyptus

Division	Magnoliophyta
Class	Magnoliopsida
Order	Myrtales
Family	Myrtaceae
Genus	Eucalyptus
Binomial name	*Eucalyptus globulus* Labill.

This tree is native to Australia and was introduced in Europe in the XIX century.
This broadleaf, evergreen species normally reaches 45 m in height and 2m in diameter.
The bark has unique characteristics because it falls off in long strips and then some white-blue spots appear. Like all eucalyptus species, it has two different kinds of leaves: young and mature. They grow at the top of the branch making it seem like a leafy crown. Leaves contain a lot of essential oils. The roots are strong and grow very deep into the soil.

Eucalyptus is very light tolerant and does not shading from other species. It prefers moist areas without frost. This is the reason why the majority of the plantations are near the coast. It cannot survive at altitudes above 500 m and the growths are not good above 45º northern latitude due the cold weather. The Blue Gum tree prefers temperatures between -4ºC and 38ºC.

The wood is pink coloured, the sapwood is lighter than the heartwood, heavy and hard, with a homogeneous texture. It has excellent mechanical properties, is easily curved and has resistance to mechanical impacts. The main application for this wood is pulpwood production. Most of the plantations are established to provide medium to low-density wood, short-fibered pulp for paper and sawn-wood.

The density is 700 kg/m^3(F. Peraza et al. 1996) and the solubility could be 2,4 in hot water or 13,2 in NaOH 1%(F. Peraza et al. 1996). The specific weight is 0,83 g/cm3(J. Gerard, 1994). The fibers are inclined with an average length of 0,7-1,1 mm (F. Najera, and López, 1969). There are no many knots in the wood of this species, because the trees are planted in really high densities avoiding the growth of strong branches.

3.3.2 Monterey pine

Division	Pinophyta
Class	Pinopsida
Order	Pinales
Family	Pinaceae
Genus	Pinus
Binomial name	*Pinus radiata* D.Don

Originally from the South of California, this species also has presence in the South West of Europe, New Zealand, Chile, South Africa and Australia. It was introduced to Spain in the XIX century.

It could be 30m in height but usually the average height is 20m. The branches are horizontally disposed at the beginning and then turn vertical resembling candelabra. It is a three needled pine, with bright green colour and above 10 cm long. The needles can be 3 years old. The roots grow in the first 60 cm of the soil.

Usually this species is cultivated up to a maximum of 800m above sea level, in areas with high moisture. It is sensitive to late frosts. The growth of Monterey pine is faster in Spain than in its original area maybe because in the North of Spain there are no dry periods during the summer. The growth per hectare per year in Spain is over $14m^3$(INIA, 1991)

The wood is homogeneous without much resin but a high density and it is, therefore, considered a soft-wood like the most of the pines, however, it is elastic and flexible. It's very appreciated for carpentry and furniture, structural use and pulpwood.

In the pulpwood industry it is recommended for mechanical process, one problem with this specie is the high presence of knots so the paper produced could has low quality due the apparition of spots. The average production is 450 kg of pulpwood from $1m^3$ of wood with bark (S.Vignote, 1985)

The colour of the wood is white-yellow but gets dark easily in presence of light (S. Vignote 1985). The fibre length is above 2,8mm.(Caperos and Serfaty, 1969). The wood has a density of 380 kg/m^3 (R. Argüelles and Arriaga 1996) with a specific weight of 0,5 g/cm^3 (S. Vignote, 1985). The solubility in hot water is 2.69 and 12.98 in a NaOH 1% solution (Bustamante and Caparros, 1966).

3.3.3 Scots pine

Division	Pinophyta
Class	Pinopsida
Order	Pinales
Family	Pinaceae
Genus	Pinus
Binomial name	*Pinus sylvestris* L.

The native area of this tree is Europe and Asia. Nowadays it occupies the space between Ireland and the South of Spain to Siberia and Lapland. It is very common in Central Europe and in the Scandinavian Peninsula.

This evergreen coniferous tree usually reaches 30m in height, with an asymmetric crown. The root system is quite strong. The stem is straight and cylindrical and self-pruning is common, so usually the lowest branches disappear. Characteristic of this tree is the orange colour in the upper part and the base of branches. The needles grow in pairs and the length is around 3 to 7 cm.

It has the biggest distribution area of all species of *Pinus*, so it is really variable in terms of growth requirements. Scots pine can grow in many different conditions. It can survive in dry areas, with only 400mm of precipitation and in extreme winter conditions. It also grows from sea level to 2600m above sea level. The annual growth is from 1,5 to 5 m^3 per hectare and year (S.Vignote, 1985)

The wood is resinous with good quality; it doesn't have many knots. It is used for construction, joinery, carpentry and pulpwood. For pulpwood the small trees are not really good because of the high amount of resin present.

The colour is quite white-pink. The fibres in the wood are straight with a length around 3,6mm (Caparros and Serfety, 1969). The wood of Scots pine has a density of 450 kg/m^3 (S. Vignote, 1985) a specific weight of 0,502 (Wegenfhur and Scheiber, 1974) and a solubility in hot water of 2,07 and 21,13 in NaOH solution (S. Vignote, 1985).

3.3.4 Norway spruce

Division	Pinophyta
Class	Pinopsida
Order	Pinales
Family	Pinaceae
Genus	Picea
Binomial name	*Picea abies* (L.)Kars.

Norway spruce is a native species in Central Europe, growing from the Scandinavian Peninsula in the North to the Balkans in the South.

The most unique characteristic of the spruce is the pyramidal crown, dense and regular with a very dark green colour. It can reach 70m in height but normally gets only 30-50m. The roots grow superficially so spruce tree has a lot of problems with wind. The needles are short and strong from 1 to 2,5cm in length.

In Central Europe, the Norway spruce is a mountain tree but in Scandinavia and Russia it grows on flat areas. This tree requires moisture in the air so it can't grows in dry areas. The high dense crown makes a really poor understory due to the lack of light. Usually spruce does not self-prune. An interesting example is one spruce in Sweden, which seems to be the oldest tree in the world, which is about 9550 years old (Kullman, L. 2008)

The wood from spruce is light-yellow, and is known as "white wood", very light and soft. It's also used for construction, sticks, musical instruments and pulpwood; also a common use for this tree is as Christmas tree.

The fibres are very straight with exceptions next to the knots, which are really numerous. The density is 417 kg/m^3(Argüelles and Arriaga, 1996) the specific weight is 0,47g/cm^3 (Wagenfhur and Scheiber, 1974). The solubility in water is around 1,4-1,8% (Wagenfhur and Scheiber, 1974).

3.4 Wood Production in Sweden and Spain

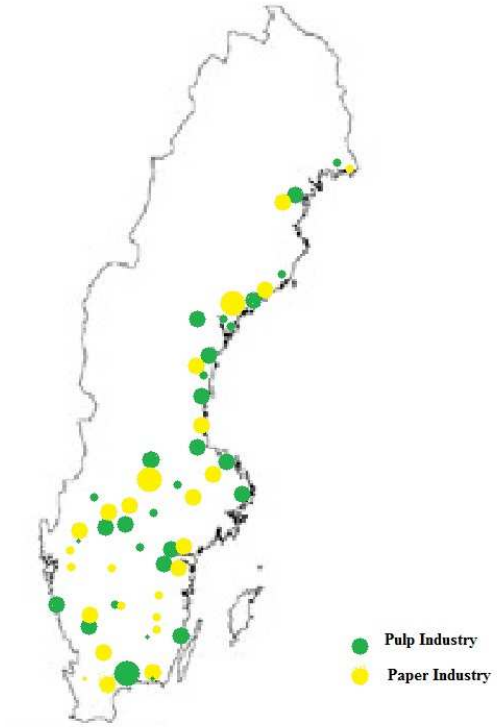
Spain and Sweden are quite similar countries in forested area, but they don't have the same point of view for forestry; the Swedish are more producers and the Spanish more conservationists. Also, the differences exist in the type of vegetation and these are reflected in the production of wood in the rough as table 1 shows

Table 1. Annual production of roundwood, hardwood and softwood, m^3 in Sweden and Spain in the year 2009 (FAOSTAT, 2011)

	Hardwood (thousands of m^3)	**Softwood (thousands of m^3)**
Spain	8330	6170
Sweden	6000	59100

In softwood production, Sweden produces almost 9 times more than Spain, quite normal because the Swedish forests are almost entirely pine and spruces. In hardwood, Spain has a bigger production. This could be due to the use of eucalyptus and other species that can grow in the climatic conditions of South-Western Europe.

3.5 Pulp and Paper Industry



Sweden has a big net of pulp and paper mills. 16 pulp companies operate in the country at 35 different localities (Figure 9). Then 24 paper companies process the pulp into paper in 46 paper mills (Skogsstyrelsen, 2010)

Figure 9.Localisation of pulp and paper industry in Sweden (Skogsstyrelsen, 2010)

Spain has12 pulp industries (the most of them in the North, next to the productive areas of the wood) and 83 paper industry. Figure 10 shows the different locations.

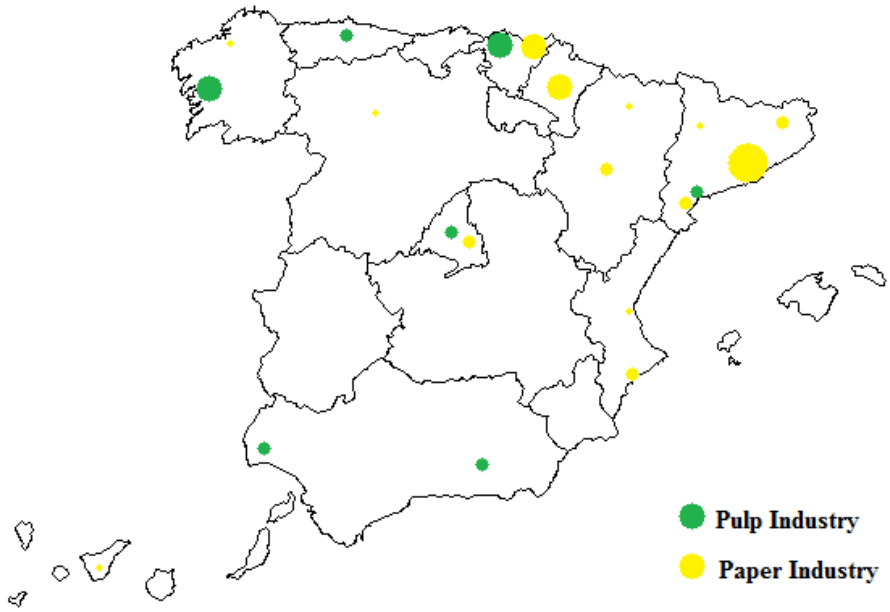


Figure 10. Geographical localisations of pulp and paper industry in Spain (ASPAPEL, 2011)

The production of mechanical and chemical wood pulp is approximately three to four times higher in Sweden compared to Spain as we can read in table 2. We expected that Spain would have higher production of mechanical pulp due to a higher hardwood production. This is not the case because Spain does not have enough industry to process the wood that is instead exported as round wood. On the other hand, Sweden makes more chemical pulp than mechanical, quite normal because the production of softwoods is bigger in this country.

Table 2. Annual production of pulp, tonnes in Sweden and Spain in year 2009 (FAOSTAT,2011)

	Mechanical wood pulp (thousands of tonnes)	**Chemical wood pulp (thousands of tonnes)**	**Semi-chemical wood pulp (thousands of tonnes)**	**Other fibre pulp (thousands of tonnes)**
Spain	90	1882	0	900
Sweden	3322	7873	279	0

For other fibres pulp, Sweden doesn't have production but Spain is one of the biggest producers in the world.

In the products section the results are quite different. As we can see in table 3 Spain has enough industries to use the pulp so it can compete against Swedish industries in production capacity for some articles as: paper and paperboard, other papers packaging and household and sanitary papers. The total amount of products produced is 4.5 millions of tonnes for Spain and 10 millions of tonnes for Sweden (2009).

Table 3.Production of the main products, thousands of tonnes in Sweden and Spain during the 2009(FAOSTAT, 2011)

	Spain	**Sweden**
Folding Boxboard	309	2376
Wrapping Papers	49	984
Printing + Writing Paper	1589	2884
Paper + Paperboard NES	683	121
Other Papers Packaging	153	0
Household + Sanitary Paper	727	338
Newsprint	384	2405
Coated Papers	689	904

3.6 Trade Flows

When we analyze the trade, we realize that the economical crisis of the previous years has had a really strong effect, as we see the imports were reduced for the last year for both countries but more effect was seen in Spain, possibly because the crisis was also stronger in this country.

In figure 11 the import trade of wood pulp in thousands of tonnes for Sweden and Spain is presented for last ten years.

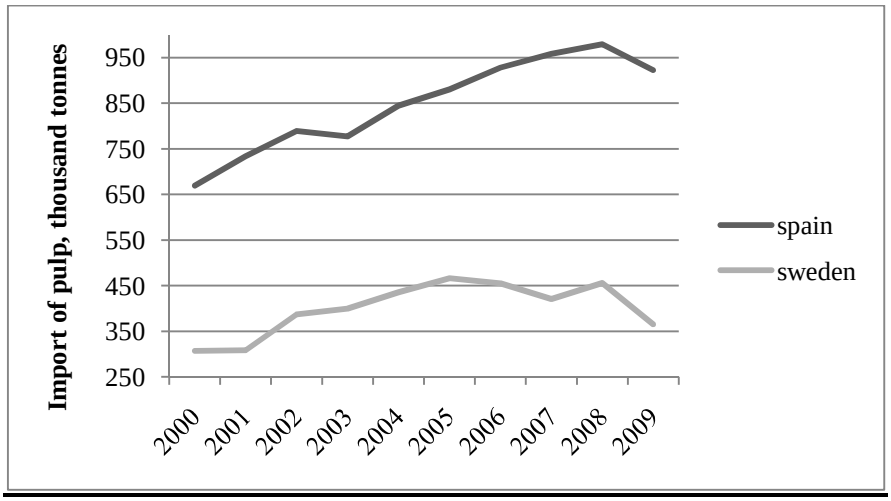


Figure 11. Annual import of pulp, thousand tonnes for Spain and Sweden (Skogtyrelssen, 2010 and FAOSTAT, 2011)

For the exports we can also see the effect of the crisis but here it is less and doesn't have much importance. Potentially it was a bit stronger for Sweden because of the international trade crisis as Sweden is one of the biggest wood producers and largest sellers

In the next graphic, figure 12, we can see the export trade in tonnes during the last ten years

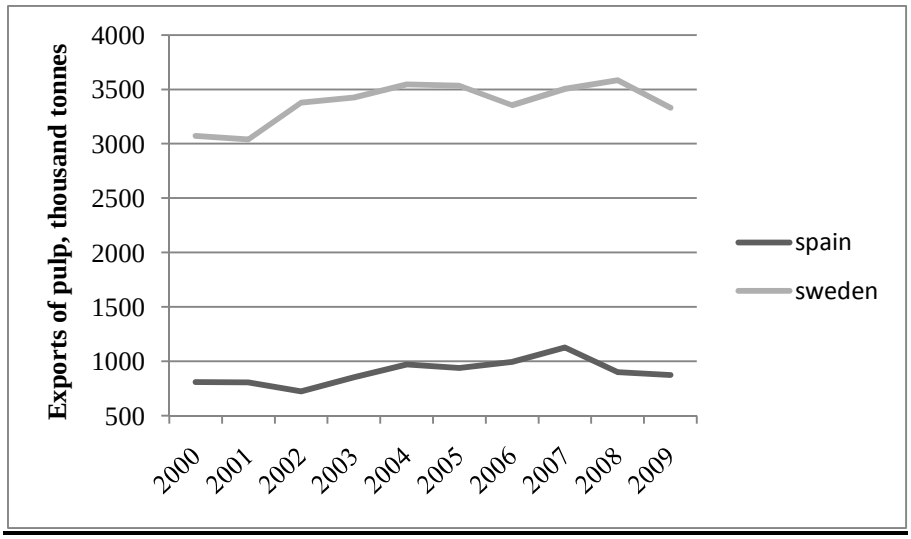


Figure 12. Annual export of pulp, thousands of tonnes for Spain and Sweden (Skogtyrelssen, 2010 and FAOSTAT, 2011)

The next two tables, 4 and 5, show the ten main origins and destinations for the imports and exports, the quantities are in tonnes and the values in 1000 $, for the year 2008.

Table 4.Export and import of pulp, thousands of tonnes, and the value, millions of dollars, in Spain. 2008 (FAOSTAT, 2011)

Spain					
Imports			Exports		
	Quantity	**Value**		**Quantity**	**Value**
Sweden	206	76	Netherlands	219	283
Portugal	160	108	Germany	194	203
Chile	157	103	Italy	123	85
France	141	102	U.K.	108	81
U.S.A	133	88	France	87	79
Belgium	103	3,5	Austria	40	25
Brazil	59	3,5	Poland	38	25
Canada	58	78	Switzerland	38	27
Finland	53	40	Turkey	25	19
Norway	22	14	Sweden	17	12
Germany	14	15	Portugal	11	7,3

Table 5. Export and import of pulp, thousands of tonnes, and the value, millions of dollars, in Sweden. 2008 (FAOSTAT, 2011)

Sweden					
Imports			Exports		
	Quantity	**Value**		**Quantity**	**Value**
Norway	240	88	Germany	1517	636
Finland	87	57	Italy	291	250
U.S.A.	49	33	France	213	157
Brazil	38	26	Spain	206	76
Chile	36	25	Poland	120	105
Belgium	20	13	Austria	117	95
Netherlands	19	13	China	114	75
Spain	17	12	U.K.	106	162
Portugal	13	9	Netherlands	100	75
Germany	6	4	Belgium	86	82
Estonia	4,6	3	Indonesia	77	63

Analyzing the import/export flow we realized that the two countries have a strong relation due to the fact that Spain's number one import comes from Sweden and Spain is the fourth main destination for Swedish pulp export.
Working with this data the two countries have a positive balance, 185 millions of US$ for Spain and 1495 US$ for Sweden. The account is positive for Spain because the cost to import pulp from Sweden is really small compared with the others.

The difference of amount between Sweden and Spain show us that forestry is a really important industry in the economics of Sweden.

4. CONCLUSIONS

- Sweden is one of the most important producers of pulp and paper products in the World.
- Spain has wood production but does not have enough industry to process it so most of the wood is exported as round wood.
- Spain is a big producer of non-wood pulp.
- The economical crisis during the years 2008 and 2009 has been reflected in the international trade.
- Forestry is an important factor for the Swedish economy.
- We highlight the ease of searching for data in the Swedish administration, in contrast to the limited information available for Spain.

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