

# Stakeholder recommendations based on demonstration activities

February 2016

The demonstration activities held under the working package 5 (WP5) of the LogistEC project aimed at drawing on the conclusions obtained in research WP 1 to 3, in order to demonstrate their applicability and benefits for the biomass supply chains under real operational conditions.

These demonstrations have served as a very interesting platform in order to study different cultivation and harvesting techniques for energy crops under real operational conditions. It has helped to test new or improved technologies in the logistics chain under different conditions. Based on the results obtained, stakeholders can have a more realistic view of these new systems. As it has been seen in these trials, it is very important to take into account different variables which can affect the final result, such as harvesting machinery, baling or transport.

## GENERAL RECOMMENDATIONS

These demonstrations have been made for different types of biomass and in 4 different European countries (**Spain, France, Italy** and **UK**):

- Herbaceous annual crops: sorghum, triticale and oat
- Herbaceous perennial crops: Miscanthus

- Wood SRC (short rotation coppice): poplar and willow

Therefore, based on the studied cases carried out during the LogistEC project, here are some general recommendations that could be given to stakeholders for the different crops studied

## CEREAL-LEGUME INTERCROPPING

- In the case of Miajadas region, it is not possible to recommend cereal-legume intercropping practices, since an increase of biomass production associated to legume crop has not been observed (legume crops have not grown properly in any case):
  - The results have been the same for vetch and pea
  - It has been seen that an important parameter to be taken into account is the quality of the parcel of land where the crops are developed: Obviously, good soil, better productivity.
- In soils which do not have nitrogen deficiency, nitrogen dose in oat cultivation can be lower than the one used in the project (<75 kg/ha)

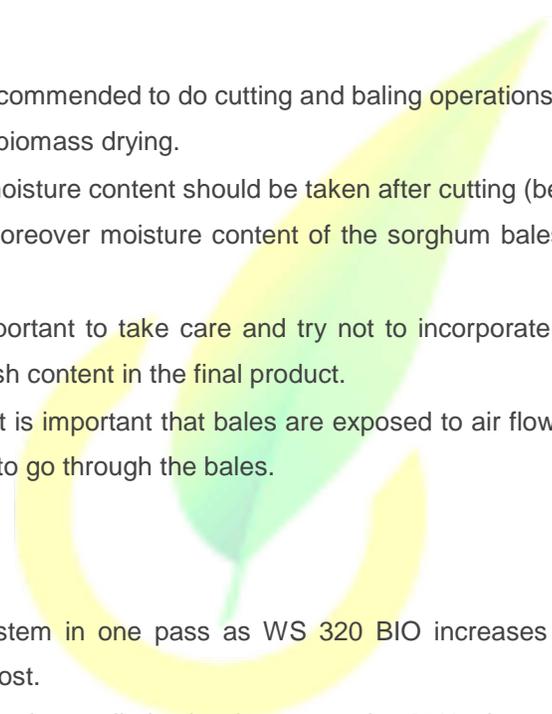
## SORGHUM

- In harvesting stage, it is recommended to do cutting and baling operations using a two passage system, in order to achieve a natural biomass drying.
- Special care of sorghum moisture content should be taken after cutting (before baling), and until it is taken to the plant and stored. Moreover moisture content of the sorghum bales should be monitored carefully during the storage stage.
- After cutting, it is very important to take care and try not to incorporate soil mixed with biomass which produces an increase of ash content in the final product.
- When sorghum is stored, it is important that bales are exposed to air flow and not covered with materials which do not allow air flux to go through the bales.

## MISCANTHUS

- Miscanthus harvesting system in one pass as WS 320 BIO increases productivity, it saves time and therefore it helps to save cost.
- Use of additives for Miscanthus pelletization increases, by 25%, the operation efficiency in production during the process, and it helps to decrease energy consumption, although pellet quality obtained is not very high.

## POPLAR



- It is recommended to do harvesting operations when leaves have fallen down, preventing ash content increase in the final product.
- From the economical side, harvesting using a cut-and-chip harvester is 30% more cost effective than using a whole stem harvester.
- In order to control biomass losses during storage, it is recommended to consume wood chips as soon as they reach permissible values of moisture content to be used in a boiler (<25%). In the case of whole logs, it is possible to extend the storage period, since biomass losses are lower.
- Although the amount of biomass that can be stored per square meter in higher wood chips piles is greater, it is recommend limiting the height pile to about 3 meters, so biomass can be better naturally dried.

### DENSIFICATION SYSTEM IMPROVEMENTS

- A high die temperature (215°C) is preferable for briquetting. Power consumption is lowered, and briquette quality increases
- Briquetting of torrefied woody biomass was feasible while briquetting of herbaceous material has not been successful.

### SUPPLY CHAIN MANAGEMENT

- Use of ERP software for biomass supply provides valuable information for improving the logistics chain, helping to optimize transportation routes, and it helps to reduce supply costs.
- Since we are dealing with energy crops, it is very important to express biomass production based on its energy content rather than its biomass yield, this is so the energy that is being carried through the logistics chain is known, allowing a better comparison of the different systems used.

### SRC WILLOW HARVESTING

The modified CRL medium scale header improved the work rate and chip quality of the harvesting process and subsequently lowered maintenance costs of the SRC willow harvester. When compared to the existing large scale header and harvester, overall costs were reduced by 8%.

- It provided a better feeding system by reducing crop blockages and subsequent downtime of the machine.
- The quality of the chip was improved as there was a more consistent feed into the chipping drum.
- As there are no less parts within the header, maintenance costs are reduced.
- The reduction of header size improves the manoeuvrability of the machine within the field and enables the machine to be transported more easily to each field.