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Yield and composition of forage maize: interaction of harvest date, cultivar and plastic mulch

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Introduction Forage maize is established as a crop with the potential to consistently supply high yields of quality forage on some Irish farms. Despite its success, considerable variability in crop yield, quality and maturity at harvest can exist from year to year. These reflect differing prevailing weather conditions, particularly temperature during May to September. The use of plastic mulch has increased the likelihood of achieving higher yields of high quality crops and has permitted maize production to extend into areas once considered unsuitable for the crop. In this experiment two cultivars of differing maturity were grown with or without plastic mulch to examine how yield and composition altered during the harvest window of early September to early November.

Materials and methods Two forage maize cultivars of differing maturity under Irish conditions (Tassilo: FAO 210 (early) and Benicia: FAO 270 (late)) were grown at Oak Park in 2002. Each plot consisted of 4 rows (70 cm spacing) of 5 m length sown in duplicate blocks either uncovered (NP) or under complete-cover clear polythene mulch (P; 6 micron; IP Europe Ltd) on 24 April using a Samco precision seed drill at a seed rate of 100,000 seeds/ha. Standard fertiliser (150 kg N, 50 kg P, 200 kg K/ha) and weed control (4.5l atrazine/ha) were both applied pre-sowing. Crop samples (2x1 m per plot) were taken every 10 days from 10 September to 09 November. Data were analysed as a repeated measures analysis of variance using Genstat 7th Edition.

Results Plastic mulch increased ($P < 0.001$) crop DM yield, the proportion of cob in crop DM, crop starch content and crop DM content for both cultivars, as shown in Figures 1-4. The late cultivar Benicia demonstrated the greater increase ($P < 0.05$) in cob proportion and starch content when sown under plastic cover. As harvest date was delayed an increase ($P < 0.001$) in crop DM content, cob proportion in DM and starch content was observed (Figures 2-4). Yields of DM increased initially but remained constant once peak yield was achieved which tended to be before mid October (Figure 1). Cultivar type did not influence ($P > 0.05$) overall DM yield but the early cultivar Tassilo did have increased ($P < 0.001$) crop DM, cob proportion and to a lesser extent increased ($P < 0.05$) starch content compared to Benicia under both sowing regimes.

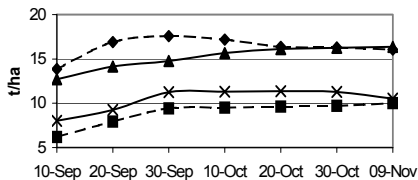


Figure 1. Crop DM yield over time

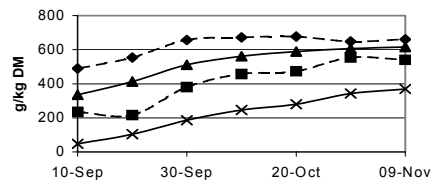


Figure 2. Cob DM in crop over time

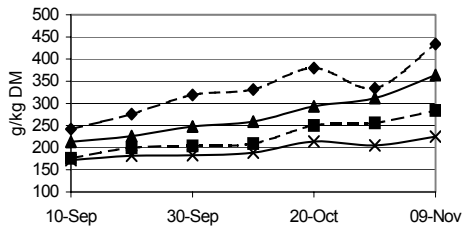


Figure 3. Crop DM content over time

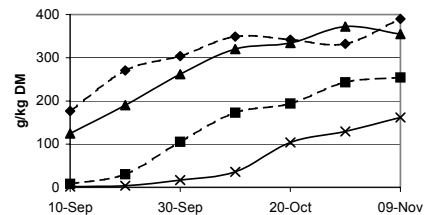
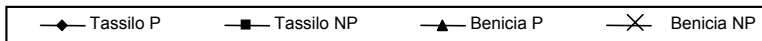


Figure 4. Crop starch content over time



Conclusions Plastic mulch increased crop DM yield, cob proportion and starch content and advanced crop ripeness (increased crop DM content) in both cultivars. Little yield benefit was obtained from prolonging harvest after 30 September, however starch content and cob content in DM of the plants, particularly those not grown under plastic (NP), continued to increase after this date. Tassilo (early) was about three weeks more advanced in terms of crop ripeness than Benicia (late) when grown under plastic. Benicia grown without plastic mulch did not mature to the desired level and remained very low in DM content.