ing and utilizing the lignin by-product of the process, promises to make the production of ethanol from cellulosic feedstocks much more attractive in the future. If biotechnological research produces new organisms which can improve the efficiency of the overall process, ethanol from biomass may become a much more attractive alternative energy option in the future.

CONCLUSION

Canada could become a world leader in cellulose-to-ethanol technology by encouraging the research, development and demonstration of novel processes already being developed in this country.

RECOMMENDATION

The Committee recommends that the Federal Government, through Canertech, encourage the research, development and commercialization of cellulose-to-ethanol technology.

The controversy over whether or not ethanol production from agricultural crops results in a net energy gain remains to be resolved. If there is a net energy gain, it is certainly small. Similarly, the controversy over whether agricultural crops should be used for food or for fuel rages on. Many observers now agree, however, that two competing end uses for the same product will inevitably lead to increased food prices and perhaps, in some instances, to food shortages in the future.

CONCLUSION

The Committee believes that fuel ethanol should be produced from spoiled and/or surplus crops and from crops grown on marginal land. Only in special circumstances should prime agricultural land or crops be exploited.

CONCLUSION

The Committee believes that exploitable ethanol feedstock resources (not counting cellulose) cannot provide enough ethanol to power the whole transportation sector.

RECOMMENDATION

Ethanol should be used as a gasoline extender only and not as a substitute transportation fuel in pure form, except perhaps on farms.

Individuals and members of farm co-operatives may wish to proceed with alcohol production using surplus or damaged crops or biomass grown on marginal land. To date, experience with the on-farm production of alcohol in the United States has shown that this can be an expensive and frustrating venture. Nevertheless, some farmers feel such production could be profitable and provide a measure of energy self-sufficiency on the farm. There is no single recommended method for ethanol distillation and each operation must consider the availability of conventional fuels for the distillation process as well as the kind of ethanol feedstock available. For example, the amount of ethanol which can be derived from different crops varies widely (Table 6-2). Furthermore, farmers must take into account the capital investment required for stills and the use to which the alcohol and by-products of distillation will be put.

Table 6-2: POTENTIAL ALCOHOL YIELD FROM SELECTED STARCH- AND SUGAR-CONTAINING CROPS

Crop	Yield[a] (litres/tonne)
Corn	430
Winter wheat	410
Barley	390
Rye	390
Spring wheat	380
Mixed grains (West)	350
Buckwheat	350
Peas, beans	350
Mixed grains (East)	330
Oats	270
Potatoes	110
Jerusalem artichokes	87-100[b]
Fodder beets	70-77[b]
Sugar beets	70
Field roots	30

[a] Yield assumes a maximum theoretical conversion to alcohol of 95%. The efficiency on farms would more likely be 50 to 85%.
[b] Preliminary values.

Source: Canada, Department of Agriculture, 1980, p. 4; and personal communication, Department of Agriculture, 1981.

The on-farm distillation of ethanol can give a measure of independence from conventional fuels because gasoline engines can burn gasohol containing between 10 and 20% ethanol without modification and apparently without causing damage. Kits are being developed to allow gasoline and diesel engines to burn mixtures of