

also is quite limited. According to CAST (1980) most soils farmed in the United States today have less than half of their original endowment of organic matter. The main reason is that plowing the soil speeds microbial decomposition of humic material containing the organic matter. Humus and organic matter in the soil can be increased by return of crop residues and animal wastes, but as we already have concluded, most of these materials that can be economically incorporated in the soil already are.

The only source of organic material that has much promise for replacing nitrogen fertilizer on a significant scale over the next decade or so is leguminous crops.<sup>3</sup> This, of course, is what alternative agriculture proposes to do. Apart from whether these crops can produce enough nitrogen to replace that now available in fertilizer--an unsettled question in our judgment--it is the necessity of including these crops in rotation with main crops which depresses the yield of the latter per acre of land in the rotation. And this yield penalty is a principal reason for the conclusion of all the studies we have considered that wholesale conversion to alternative agriculture would drive up the costs of agricultural production, increase the amount of land in crops, and have unfavorable (except for farmers) macro-economic consequences. It seems necessary to conclude that the inelasticity of supply of organic forms of nitrogen (and other nutrients) would impose higher economic costs of production on American agriculture should alternative agriculture be substituted wholesale for the conventional system.

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3. Research on biological nitrogen fixation may in time enhance the ability of leguminous crops to fix nitrogen and, in more time, teach corn and other non-leguminous crops how to do this also. This would make alternative agriculture more attractive economically, although the research is not being done for that reason.