5-KETO CLOMAZONE TARGETS 1-DEOXY-D-XYLULOSE 5-PHOSPHATE SYNTHASE OF NON-MEVALONATE PATHWAY IN ISOPRENOID BIOSYNTHESIS. Yurdagul Ferhatoglu, Michael Barrett, and Joe Chappell. Graduate Resaerch Assistant and Professors, Department of Agronomy, University of Kentucky, Lexington, KY 40546.

Clomazone or an active clomazone metabolite(s) is thought to inhibit chlorophyll and carotenoid biosynthesis through inhibition of a step(s) of the isoprenoid pathway. Historically, isoprenoid biosynthesis was thought to proceed from mevalonate. However, recently a second isoprenoid pathway localized in the chloroplast and proceeding from pyruvate and glyceraldehyde-3-phosphate was identified. The new chloroplast isoprenoid pathway is responsible for chlorophyll and carotenoid biosynthesis. We developed an assay using isotonic sorbitol for isopentenyl pyrophosphate (IPP) incorporation and slightly isotonic sorbitol solution for pyruvate incorporation into carotenoids to test the effect of clomazone and clomazone metabolites on the chloroplastic isoprenoid pathway. Clomazone and clomazone metabolites did not inhibit formation of products from IPP in the studies using intact spinach chloroplast. However, a clomazone metabolite 5-keto clomazone and the 1-deoxy-D-xylulose 5-phosphate (DOXP) reductosiomerase inhibitor fosmidomycin inhibited the formation of a non-polar product cochromatographed with xanthopylls when pyruvate was used as a precursor. DOXP reductoisomerase is the 2$^{nd}$ step in the chloroplastic isoprenoid pathway. Although 5-OH clomazone, 5-keto clomazone, and clomazone (parent) all showed herbicidal activity on periwinkel (*Catharanthus roseus*) seedlings, in an in vitro assay only 5-keto clomazone inhibited periwinkel DOXP synthase. DOXP synthase catalyzes the 1$^{st}$ committed step in the chloroplastic isoprenoid pathway. Our present hypothesis is that clomazone (inactive) is converted to 5-OH clomazone (inactive) which is, in turn, converted to 5-keto clomazone (active). The activity of 5-keto clomazone against DOXP synthase was also recently demonstrated by Mueller et al.(2000).