the herbicide, as occurred in this study.

Future of Soybean Oil in the Application of Herbicides

Reducing the carrier volume to very low amounts was the major benefit observed from the use of SBO with rotary nozzles. This greatly increases the efficiency of spray operations because the frequent refilling associated with current application methods is eliminated. This also will decrease the cost of spraying since a greater area can be sprayed each day and there is little need for trucks hauling carrier to the field. The initial greater investment associated with rotary nozzles compared to conventional sprayers would be recovered in several years.

The most immediate promise for the widespread adoption of SBO is as an additive to postemergence herbicides applied with conventional sprayers, because investment in new equipment is not needed. Results from the johnsongrass study (Table III) and more recent research indicate that it is equal to PCOC in enhancing the activity of essentially all postemergence herbicides.

Growers using SBO as a carrier will need to clean their equipment frequently because a film of oil deposits on it during spraying. Compatibility between the SBO and each herbicide will need to be determined in advance to preclude problems in the field. In addition, applicators may need to wear protective clothing more routinely because the oil may increase absorption of the herbicide through the skin.

Studies are continuing at Southern Illinois University and at other universities to further evaluate the potential of SBO as a carrier and additive for herbicides.

REFERENCES


Trends in Industrial Use of Vegetable Oils in Coatings

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ABSTRACT

Alkyd resins continue to be a major factor in coatings. Increased oil consumption in alkyd manufacture is not expected to be significant. Projections indicate a modest growth in total coatings usage at 2-3% per year. The industry is facing diverse coating performance demands that will bring unusual, more costly ingredients into use, and versatility of alkyd resins. Increased use of oil-based resins is expected in emulsion (latex) paint modifiers to improve adhesion and early water resistance. The coatings industry, at least in maintenance and industrial coatings, is adopting a cost/sq ft/year economic evaluation, factoring in the useful life of the coating.

INTRODUCTION

Very few indicators, if any, point to significant change in the overall consumption of vegetable oils in the surface coatings industry in the U.S. during the next five years. Projections indicate a modest, continued physical growth of 2-3% per year in coatings consumption, more particularly in resin solids. Fluctuations are anticipated in total coatings dollar value due to business cycles, inflation rates and variations in raw material supply costs.

The impact of changes in coatings consumption or technology on vegetable oil usage will be difficult to discern. Industrial usage of vegetable oils is small compared with total food uses. Estimates vary, but generally agree, that only 5-7% of total vegetable oil consumption occurs in non-food uses. Therefore, it is difficult in an established industry such as surface coating resins to discuss changes that would demonstrate a significant impact on total oil industry volume.

Nevertheless, this paper will examine the paint industry in the U.S. with comments toward expected technical developments in film-forming resin compositions.

DISCUSSION

Any useful perspective requires some understanding of the paint industry and its raw materials.

From 1970 to 1982, U.S. paint production increased from 830 million gallons to 930 million gallons, with a peak year of 1065 million gallons in 1979 just prior to the economic downturn in automobiles, housing and durable goods. During the same period, the value of U.S. paint production rose from $2.6 billion to $8.3 billion. Value per gallon steadily rose during the 12-yr period.

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from $3.00 to $9.00, reflecting increased raw material costs, higher cost/higher performance coatings and inflation.

Total 1982 U.S. surface coatings fall into the three categories shown in Table I.

Chemical Economics Handbook-SRI International (2) has provided the latest (1982) coatings raw material picture (Figure 1).

Of the 2,245,000,000 lbs of film-forming resins, vegetable oils or the corresponding fatty acids are a component in the alkyd, epoxy ester, urethane (oil modified or urethane-alkyd), and some polyester resins, in addition to drying and semi-drying oils. Dimer acid-based polymeric solids also would be included.

Alkyds range from zero ("oil-free" alkyd polyesters) up to about 65% oil base, depending on end use and curing methods. It is difficult to estimate the amount of vegetable oil consumption in this as well as other coatings applications.

A recent industry review (3) reports 1983 volume consumption up about 12% from 1982. First half 1984 gallons shipped are reported 9-12.3% larger than the corresponding six months of 1983. Architectural coatings have enjoyed a large share of this growth; product coatings also increased. This represents housing and automotive trends in particular.

The numbers for the various types of resins are not yet available for 1983 or 1984. However, housing would include both oil- (alkyd) and non-oil-based resins; interestingly, the drive toward lower volatile paint solvent emissions is converting some auto makers from high solvent lacquers to alkyds, followed by clear top coats.

Positive industry trends that indicate continued use of vegetable oils include a growing use of water-reducible alkyds, containing less volatile organic solvent, and a resurgent consumer interest in wood stain finishes (either solvent or water based). Attractive stable prices in the 25-35¢/lb range for vegetable oils continue to make them the lowest cost of any alkyd film-forming ingredient.

Negative trends may develop from general business changes and swings in decorator styles (use of wallpaper, carpeting, tile, glass). Specialty performance demands may require coating resins with no, or low, oil content. Many significant long-term coating applications now are evaluated by a newer economic measure; namely, cost/sq ft/year. Not

TABLE I

Use and Value of U.S. Surface Coatings, 1982

<table>
<thead>
<tr>
<th>Coating type</th>
<th>Percent of volume</th>
<th>Value, billions of $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural coatings*</td>
<td>51</td>
<td>4.0</td>
</tr>
<tr>
<td>Product finishes/DEMb</td>
<td>29</td>
<td>2.6</td>
</tr>
<tr>
<td>Special purpose coatings*</td>
<td>20</td>
<td>1.7</td>
</tr>
</tbody>
</table>

\*Includes undercoatings, sealers, primers, topcoats, stains, varnishes
\*Includes paper, film, foil, furniture, metal, pipe, appliances, industrial and consumer coatings

*Includes automotive, high performance maintenance, machinery refinishing and traffic paints.