The main purpose of this chapter is to cover agronomic aspects of ammonia usage; that is, to consider the effects of rates of application, times of application, and various placements of ammonia on crop response to ammonia. It should be noted that crop response refers to yield response of the harvested portion of the crop.

Effect of rate of application can be quite variable, depending on the crop under consideration. Rate of application is important in relation to the economic and agronomic aspects of ammonia use. Because of its ability to utilize large amounts of N, the corn crop is almost ideally suited for use of ammonia. The unit application cost is rather small in comparison to that for wheat. The more favorable unit application cost is due mainly to appreciably greater quantities being used for corn. Some advantage in easier application to corn may result from its being a row crop as compared to the drilled crop.

Ideal application rate cannot be decided by mere consideration of yield data, since crop quality should also be considered. It is well established that low rates of ammonia application are not likely to appreciably influence grain protein content, although yield may be substantially increased.

Time of application, as it relates to best agronomic performance, involves special considerations in the case of anhydrous ammonia. Evidence could be presented to show that if all other factors were equal, the best time to apply N for a crop is just before the crop demonstrates its peak demand for N; but such application may not be possible. Many factors determine time of application besides ideal agronomic considerations.

With wheat, for example, the ideal time might be relatively late in the spring. Applying N then will effect good increase in yield, bring about maximum increase in protein content, and induce least lodging. However, passing over the growing crop with various pieces of ground equipment will inflict so much damage as to render this particular application rather ineffective. Under such circumstances, preplant application, though it has certain agronomic disadvantages, probably will produce better yields than spring application.

Anhydrous ammonia can be applied in a variety of ways. The major