The principal factors that reduce the yield and lower the quality of wheat during its growing period in the northern spring wheat area of the United States are drought, extreme heat, high winds, frost, hail, insect pests, and fungous diseases. It is safe to say that no crop of wheat is ever produced anywhere in this area without the yield or quality of the grain being materially influenced by one or more of these limiting factors. The development of varieties of wheat that are resistant to these destructive agencies, therefore, is of great economic importance.

Yaroslav emmer, a variety of Triticum dicoccum, grown to some extent as a feed crop in the northern spring wheat area under the trade name of “speltz,” possesses considerable resistance to several of the destructive agencies mentioned above. It has a tough, flexible straw and a heavy, tight-fitting chaff, which characteristics give it considerable resistance to breaking down of the straw and shattering of the seed by wind and hail. It is practically immune to stem rust, Puccinia graminis, and very resistant to orange leaf rust, P. triticina, and probably also to loose smut, Ustilago tritici. Yaroslav emmer also has several other characters that would be of value in common wheats, such as a high capacity for tillering when grown under favorable conditions and an exceptionally high protein content. On the other hand, considered from the standpoint of a commercial bread wheat, this variety of emmer has many decidedly undesirable characteristics. Among the more outstanding of these are a fragile rachis, a poor type of kernel, a long heavy brush, an extremely soft gluten, as well as susceptibility to several diseases to which many of the bread wheats possess some resistance. Among these diseases are black chaff, anthracnose, and a form of root rot that causes firing of the plants just before ripening.

Emmer (T. dicoccum) and the common wheats (T. vulgare) belong to distinct species differing in chromosome numbers. Emmer has 28 somatic chromosomes, while the common wheats have 42. For this reason, the problem of unifying the desirable characteristics of the two

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