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ADJUSTMENT OF SEASONAL FERTILIZER APPLICATION AND ITS EFFECT ON TISSUE NUTRIENT LEVELS, FRUIT YIELD AND QUALITY

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Introduction: Many raspberry growers currently, in the early spring, apply nitrogen in the form of a soluble solid fertilizer such as urea as a top or side dress to the plant row, which is then washed down deeper into the soil by a following rain or irrigation. These amounts, often several tens of pounds of actual nitrogen per acre, are quite large compared to the rest of the season, and while the plant uptake of nitrogen is higher during this early period of growth, the plant's capacity to absorb nitrogen can easily be exceeded.

Later applications of nitrogen and fertilizers are done through the drip irrigation system. These applications are often less than a few pounds of actual nitrogen per acre and take place from once a week to once a month. These applications of nitrogen fertilizer should continue through the growing season, including through flowering and fruiting. While it is a commonly held belief that nitrogen application during fruiting causes soft, reduced quality fruit, recent research suggests this belief might be unfounded. Other factors, such as irrigation practices and disease management may have a larger effect on fruit quality than limited nitrogen use during flowering and fruiting.

It is hypothesized that California growers can achieve better caneberry yields and more fertilizer efficiency by significant adjustment to their fertility practices. Indeed, recent research in caneberries in Oregon suggests that large reductions in early season fertilizer use coupled with increases in in-season fertilizer rates result in more and higher quality caneberries.

This study is designed to investigate large adjustments to early and in-season fertilizer rates on fruit yields and quality as well as test the consequences of these adjustments on plant tissue and soil mineral contents. This information will be important to the caneberry industry since it reduces the environmentally harmful use of large amounts of nitrogen in the early winter season, while potentially offering enhanced plant productivity from more effectively timed fertilizer applications.

Materials and Methods:

A test plot consisting of 4 treatments of four replicates was set up in a well functioning field of Heritage red raspberry. Rates of applied nitrogen consisted of a grower standard, and modifications of both the early and in-season supplemental nitrogen applications (see Table 1 below). Fertilizer was applied as per grower procedure, i.e. as a top dress in the early season, and later as an irrigation drip tape applied liquid supplement.

Harvest and Fruit Evaluation: Measurement of fruit yield was done by an established procedure counting flowers and weighing fruit for a yield estimate. Fruit quality measurements was performed twice times during the harvest season in August and September by taking 15 fruit from each treatment replicate, holding for five days at 38°F, holding at room temperature for one day and then evaluating quality of the fruit by grading it good or unmarketable.

Table 1: Fertilizer application scheme, expressed in lbs of nitrogen (N) per acre.

	Nitrogen Fertilizer Regimen*
1.	Grower standard early season, grower standard in-season (43 lbs + 8 lbs = 51 lbs mineral N)
2.	½ grower standard early season, twice grower standard in-season (21.5 lbs + 16 lbs = 37.5 lbs mineral N)
3.	No grower standard early season, twice grower standard in-season (0 lbs + 16 lbs = 16 lbs mineral N)
4.	Grower standard early season, no grower standard in-season (86 lbs + 0 lbs = 86 lbs mineral N)

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