

1 Elevation, Slope Aspect and Integrated Nutrient Management effects on Crop
2 Productivity and Soil Quality in North-West Himalayas, India

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12 **Abstract:** On farm bio-resource recycling has been given greater emphasis with the
13 introduction of conservation agriculture specifically with climate change scenarios in the
14 mid-hills of the north-west Himalaya region (NWHR). Under this changing scenario,
15 elevation, slope aspect and integrated nutrient management (INM) may affect
16 significantly soil quality and crop productivity. A study was conducted during 2009-10 to
17 2010-11 at the Ashti watershed of NWHR in a rainfed condition to examine the influence
18 of elevation, slope aspect and integrated nutrient management (INM) on soil resource and
19 crop productivity. Two years of farm demonstration trials indicated that crop productivity
20 and soil quality is significantly affected by elevation, slope aspect and INM. Results
21 showed that wheat equivalent yield (WEY) of improved technology increased crop
22 productivity by ~20-37% compared to the conventional system. Intercropping of maize
23 with cowpea and soybean enhanced yield by another 8-17%. North aspect and higher
24 elevation increased crop productivity by 15-25% compared to south aspect and low
25 elevation (except paddy). Intercropping of maize with cowpea and soybean enhanced
26 yield by another 8-15%. Irrespective of slope, elevation and cropping system, the WEY
27 increased by ~30% in this region due to INM technology. The influence of elevation,
28 slope aspect and INM significantly affected soil resources (SQI) and soil carbon change
29 (SCC). SCC is significantly correlated with SQI for conventional ($R^2 = 0.65^*$), INM
30 technology ($R^2 = 0.81^*$) and for both technologies ($R^2 = 0.73^*$). It is recommended that
31 at higher elevation. (except for paddy soils) with a north facing slope, INM is
32 recommended for higher crop productivity; conservation of soil resources is